Vertebrates

There are 636 vertebrate species that have been documented in Montana. Sixty of these were determined to be Tier I (greatest need of conservation), 143 Tier II (moderate conservation need), 281 Tier III (lower conservation need), and 152 Tier IV (non-native, peripheral).

Fish

White Sturgeon (Kootenai River Population) (*Acipenser transmontanus*)

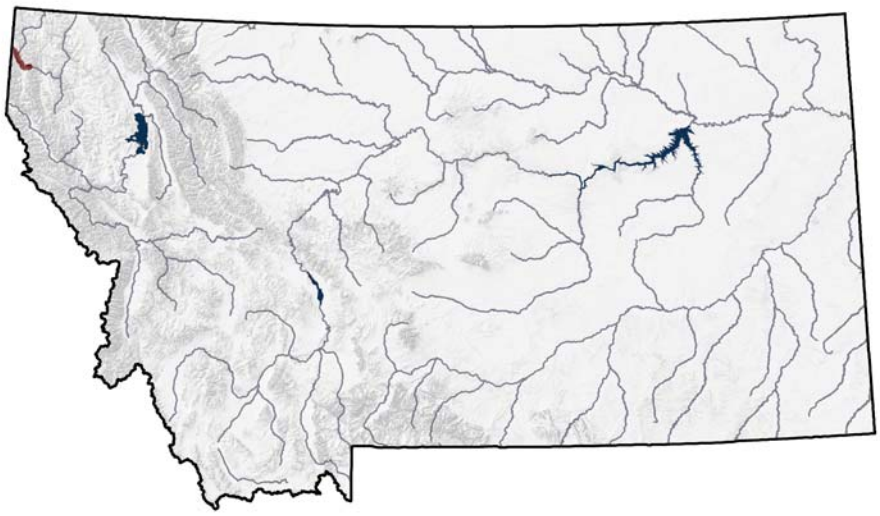

Figure 44. Distribution of the White Sturgeon

Range

The white sturgeon's range extends from Kootenai Falls in Montana, located 50 river kilometers downstream of Libby Dam, to the Corra Linn Dam at the outlet from Kootenay Lake in British Columbia. A natural barrier at Bonnington Falls downstream of Kootenay Lake has isolated the white sturgeon in the Kootenai River from other populations in the Columbia River since the last ice age approximately 10,000 years ago (Alden 1953; Northcote 1973; Duke et al. 1999; USFWS 1999) (AFS website 2003).

Habitat

The white sturgeon is landlocked in Montana and lives in the large, cool Kootenai River.

Management

Recovery of the white sturgeon population in the Kootenai River is contingent upon reestablishing natural recruitment, minimizing additional loss of genetic variability, and successfully mitigating biological and habitat alterations that continue to harm the population. Refer to the White Sturgeon Recovery Plan (USFWS 1999) for specific details promoting management of white sturgeon. The Kootenai River White Sturgeon Study and Conservation Aquaculture Project was initiated to preserve the genetic variability of the population, begin rebuilding natural age class structure, and prevent extinction while measures are implemented to restore natural recruitment (Anders and Westerhof 1996, USFWS 1999, Ireland 2000, Ireland et al. 2001 in press). A breeding plan has been implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population (Kincaid 1993). The implementation of the breeding plan includes measures to minimize potential detrimental effects of conventional stocking programs (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Reduced spring flows, unnatural flow fluctuations, and altered thermal regime caused by Libby Dam operation, which may have interrupted spawning behavior and recruitment	Coordinate flow fluctuations in Libby Dam as more natural to enhance natural production
A suite of post-fertilization early life mortality factors (embryo suffocation, predation on early life stages, resource limitations) and possible intermittent female stock limitation have been reported as possibly contributing to observed recruitment failure for Kootenai River white sturgeon	Management of non-native species that may prey on young white sturgeon
	Implement a conservation aquaculture program to prevent extinction and preserve genetic variability
Habitat conditions in the spawning areas may also affect spawning and rearing success. Cessation of periodic flushing flows has allowed fine sediments to build up in the Kootenai River bottom substrates. Fine sediments fill interstitial spaces in riverbed cobbles, reducing fish egg survival, larval and juvenile fish security, cover, and insect production	Decrease fine sediments found in lake area

	Habitat conservation of surrounding terrestrial habitat
	Reestablish suitable habitat conditions to increase white sturgeon survival past the embryonic and larval stages

Management Plan

U.S. Department of the Interior, Fish and Wildlife Service. 1999. White Sturgeon: Kootenai River Population Recovery Plan. Region 1, USFWS, Portland, OR.

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Pallid Sturgeon (*Scaphirhynchus albus*)

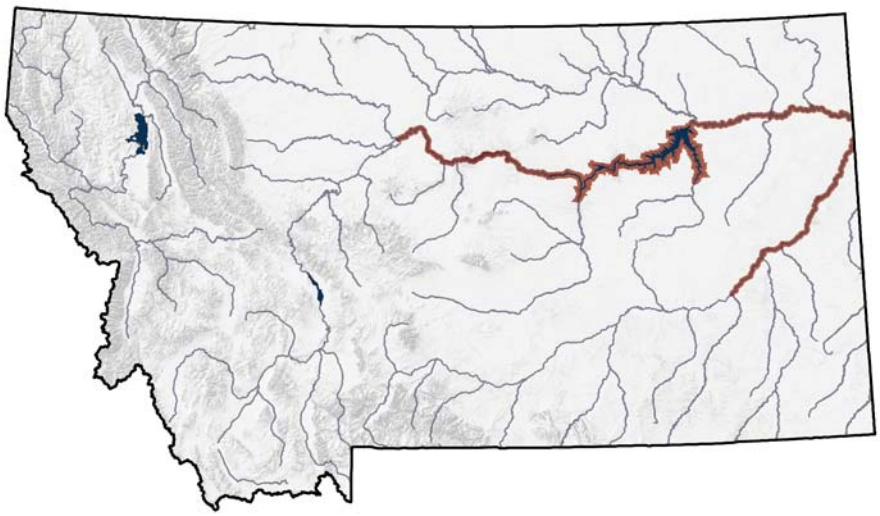

Figure 45. Distribution of the Pallid Sturgeon

Range

The pallid sturgeon is native in major rivers in eastern Montana including the Missouri River below Fort Benton and the Yellowstone River below the Carterville Diversion Dam near Forsyth.

Habitat

Pallid sturgeon use large, turbid rivers over sand and gravel bottoms, usually in strong current. In Montana, pallid sturgeon use large turbid streams including the Missouri and Yellowstone rivers (Brown 1971; Flath 1981). They also use all channel types, primarily straight reaches with islands (Bramblett 1996). They primarily use areas with substrates containing sand (especially bottom sand dune formations) and fines (93 percent of observations) (Bramblett 1996). Stream bottom velocities range between 0.0 and 1.37 meters per second, with an average of 0.65 meter per second (Bramblett 1996). Depths used are 0.6 to 14.5 meters, averaging 3.30 meters, and they appear to move deeper during the day (Bramblett 1996). Channel widths from 110 to 1,100 meters are used and average 324 meters (Bramblett 1996). Water temperatures used range from 2.8 to 20 degrees C. (Tews 1994; Bramblett 1996). Water turbidity ranges from 12 to 6,400 NTU (Turbidity Units) (Tews 1994).

Management

Beginning in 1996, research efforts focused on pallid sturgeon recovery and preserving the pallid sturgeon genetic pool through stocking. The primary purpose of the stocking program is to preserve the genetic pool and reconstruct

an optimal population size within the habitat's carrying capacity (Krentz 1997a) (AFS website 2003). In 2000 the U.S. Fish and Wildlife Service (USFWS) completed an Endangered Species Act consultation with the U.S. Army Corps of Engineers regarding operation of Missouri River dams. Through an informal agreement the U.S. Bureau of Reclamation (BOR) has agreed to provide a dominant discharge spring pulse out of the Tiber Reservoir every four to five years for Missouri River fish migrations that could help the Upper Missouri River pallid sturgeon population. To address pallid sturgeon passage and entrainment on the Yellowstone River, the USFWS has begun consultation with BOR regarding problems at the Intake Diversion Dam. The future for pallid sturgeon recovery may continue to be uncertain even after positive changes have been implemented because pallid sturgeon populations are so depleted and the newly stocked fish will take at least 15 years before the females first reach sexual maturity and begin to spawn. Therefore, it is important to realize that immediate evaluations are impractical, and recovery will take a dedicated, long-term commitment (AFS website 2003). Implementing the pallid sturgeon recovery program in this area is a multistate and multiagency task. To facilitate this, the Montana/Dakota Pallid Sturgeon Work Group was organized in 1993. The group is composed of representatives from FWP, NDGF, USFWS, USBOR, WAPA, and PPL-MT, and acts in an advisory role identifying research needs and funding sources, developing work plans, and providing an opportunity for communication between biologists and agency personnel (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat modifications such as dams prevent movement to spawning and feeding areas, alter flow regimes, turbidity, and temperature, and reduce food supply	Restore more natural flow and temperature conditions in the rivers below mainstream and tributary dams
	Protect minimum instream flow reservations to ensure that the pallid sturgeon population will not be harmed
Upstream and nearby land use practices may degrade water quality	Support government and private conservation activities that encourage and support sustainable land management practices in riparian areas
Heavy metals and organic compounds may affect reproduction	Work with agencies, organizations and public to identify and reduce point source pollutants
Hybridization with shovelnose sturgeon, possibly caused by reductions in habitat diversity	Support research to better understand hybridization issues as they relate to habitat

Low population numbers	Establish multi-aged pallid sturgeon populations in the Middle Missouri, Lower Missouri, and Yellowstone rivers to prevent extinction
	Improve knowledge of pallid sturgeon life cycle requirements and continue to research limiting factors affecting its existence

Management Plan

Dryer, M. P., and A. J. Sandvol. 1993. Recovery plan for the pallid sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service. Bismarck, ND. 55 pp.

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Paddlefish (*Polyodon spathula*)

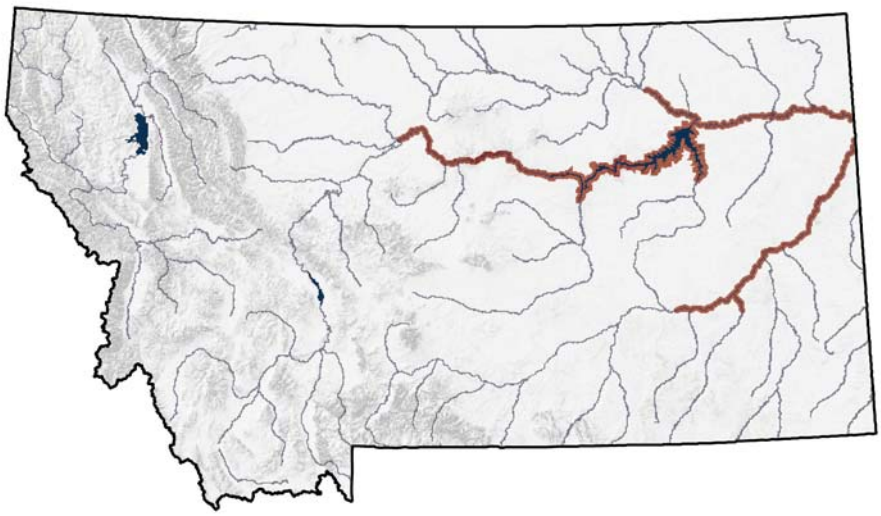

Figure 46. Distribution of the Paddlefish

Range

In Montana, two distinct paddlefish stocks are recognized. The Yellowstone-Sakakawea stock is distributed from the eastern boundary of the state up the Yellowstone River westward to the Cartersville Diversion Dam at Forsyth, as well as up the Missouri River westward to Fort Peck Dam (Scarnecchia et al. 1996b; Holton 2003). Most fish of this stock rear in Lake Sakakawea, a Missouri River mainstem reservoir in North Dakota (Fredericks and Scarnecchia 1997; Scarnecchia et al. 1997), and ascend the two rivers (mainly the Yellowstone) into Montana in spring to spawn (Firehammer 2004). Upriver distribution is more westerly in years of higher discharge. A few fish reside year-round in the dredge cuts below Fort Peck Dam. An important recreational snag fishery exists for this stock at the Intake Diversion Dam, near Glendive (Montana-North Dakota Paddlefish Management Plan 1995). Other sites on the Yellowstone River (e.g., Sidney Bridge, Richland Park, State Line) and on the Missouri River below Fort Peck Dam (e.g., Wolf Point, Frazer Rapids) also are fished. A modest bow-and-arrow fishery also exists in the dredge cuts.

The Fort Peck stock is distributed from Fort Peck Dam up the Missouri River westward at least as far as the mouth of the Marias River (Berg 1981). Most fish of this stock rear in the Fort Peck Reservoir and ascend the river in spring to spawn. Upriver distribution is more westerly in years of higher discharge. Since the closure of Fort Peck Dam, Fort Peck stock fish have been isolated from fish below the dam, although some upriver fish can pass downstream. An important recreational snag fishery exists for this stock at several sites near the Fred Robinson Bridge (Scarnecchia et al. 2000).

Habitat

The paddlefish is a large river species that utilizes a wide variety of habitats seasonally and at different life stages. Optimal spawning habitat consists mainly of turbid, faster flowing main channel areas with gravel substrates, whereas feeding habitat is typically slower moving backwaters, side channels, and sloughs where their zooplanktonic food is more abundant. In the twentieth century, Montana's paddlefish have adapted successfully to feeding in Missouri River reservoir habitat, resulting in an increased population size over historical (pre-reservoir) levels (Scarnecchia et al. 1996b). Young-of-the-year paddlefish utilize turbid headwater reaches of Fort Peck Reservoir (Kozfkay and Scarnecchia 2002) and Lake Sakakawea (Fredericks and Scarnecchia 1997) for particulate feeding. Larger juveniles and adults large enough to more effectively avoid predation (Parken and Scarnecchia 2002) filter feed throughout the reservoirs.

Management

Historical information on the Yellowstone-Sakakawea stock and fisheries in the Yellowstone River is provided in Robinson (1966), Rehwinkel (1978), and a series of Federal Aid reports (e.g., Stewart 1984) as summarized in the Montana-North Dakota Paddlefish Management Plan (1995) and Scarnecchia and Stewart (1996). Socioeconomic information on paddlefish anglers is provided in Scarnecchia et al. (1996) and Scarnecchia and Stewart (1997). Recent harvest data is summarized in a series of Federal Aid reports (e.g., Riggs 1999). Historical information on the Fort Peck stock and fisheries is provided by Berg (1981) and a series of Federal Aid reports (e.g., Needham 1984; Gilge and Liebelt 2001). Some of the latter reports also provide information on the Yellowstone-Sakakawea stock fish inhabiting the dredge cuts. Socioeconomic information on the Fort Peck stock fishery is provided in Scarnecchia et al. (2000).

Montana's goals, objectives, and approaches for paddlefish management are outlined in the Montana-North Dakota Paddlefish Management Plan (1995). This plan is being revised and updated as of 2005. Management of the Yellowstone-Sakakawea stock is a cooperative, interstate effort involving coordinated and uniform management goals, objectives, data collection, and stock assessment by the Montana Department of Fish, Wildlife & Parks and the North Dakota Game and Fish Department. For the Fort Peck stock, which is located entirely within Montana, management goals, objectives, data collection, and stock assessment are designed where possible to be consistent with that of the Yellowstone-Sakakawea stock.

Harvest management for both stocks is designed to prevent overharvest and ensure sustainable wild fisheries. An extensive data collection program for the Yellowstone-Sakakawea stock has permitted a more rigorous scientific approach

to harvest management. A harvest cap of 1,000 fish per state per year is intended to stabilize the population at its present level of about 30,000 adult fish. The harvest cap is considered a maximum acceptable harvest rather than a target catch to be met. The number of fish allowed to be harvested is based on a straightforward harvest model involving determination of population size and age structure. Population size is estimated based on jaw-tag recoveries from adult fish. Biologists accurately estimate and validate the ages of the fish caught in the fishery (Scarnecchia et al. 2005) to ensure that young adult fish are added and old fish are retained in the stock. The harvest cap is set to not exceed the most recent five-year estimated recruitment of young adults (ages 10 to 14 males and ages 17 to 21 females). Monitoring and stock assessment approaches for the Fort Peck stock (including population estimation and age determination) are being developed to permit the implementation of a similar approach to harvest management for that stock. No harvest cap for that stock currently exists.

Harvest regulations differ for the two stocks. For the Yellowstone-Sakakawea stock, harvest regulations on the Yellowstone River include an open season from May 15 through June 30, or until the harvest cap is reached. In the Missouri River below Fort Peck Dam, harvest is open all year or until the harvest cap is reached. All snagged paddlefish must be retained and tagged with a locking, individually identifiable paddlefish tag purchased by the angler. The annual bag limit for this stock is one fish per person. Catch-and-release fishing (with mandatory release), which when monitored has been shown to not cause excessive mortality (Scarnecchia and Stewart 1997b), is also permitted for two six-hour periods per week at the Intake fishing site. For the Fort Peck stock, anglers may harvest up to two fish per year (but only one if the angler already caught one from the Yellowstone-Sakakawea stock). The season is open all year, and high-grading (immediate release of captured fish) is permitted (Montana Department of Fish, Wildlife & Parks 2005). No limit is set on the total number of tags sold for either stock.

For both stocks, extensive collection of harvest data as well as adult tagging and juvenile monitoring are conducted to obtain information on age composition, population size, reproductive success, and recruitment of young adult fish. On-site and telephone creel surveys provide additional information on the fishery and harvest.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss of spawning habitat. Paddlefish spawn most effectively in turbid, free-flowing rivers with natural hydrographs and gravel, cobble, and perhaps sand substrates	Maintenance of instream flows and spawning habitat in large rivers (especially the Yellowstone River and Missouri River above Fort Peck Reservoir)

Water depletions. Excessive and increasing water depletions for irrigation during drought or low-flow years influence paddlefish migratory and spawning behavior. Adequate flows in spring and early summer are needed to initiate spawning migrations	Increased reservoir water retention during times of drought
Potential introduction of exotic competitors (e.g., bighead carp [Aristichthys nobilis])	Improved public awareness of paddlefish conservation concerns and impacts of non-native species
Overfishing. Although much progress has been made to prevent legal overfishing, vigilance is needed to prevent illegal harvest	Improving harvest management

Management Plan

Montana-North Dakota Paddlefish Management Plan. 1995. North Dakota Game and Fish Department and Montana Department of Fish, Wildlife & Parks. Bismarck, ND, and Helena, MT.

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Shortnose Gar (*Lepisosteus platostomus*)

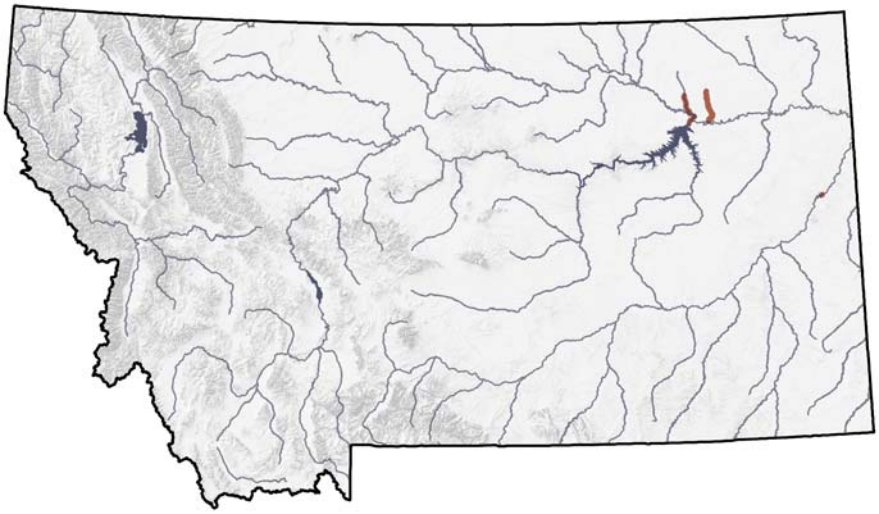

Figure 47. Distribution of Shortnose Gar

Range

The distribution of the shortnose gar within Montana is very limited, with its presence being documented primarily in the Missouri River dredge cuts downstream of Fort Peck Dam (Brown 1971; Holton 2003). The only other documented observation of shortnose gar in Montana is a single specimen collected on the Yellowstone River approximately 15 miles upstream of its confluence with the Missouri River in 1998 (K. Kapuscinski, FWP, personal communication, February 2003) (AFS website 2003).

Habitat

Due to its limited distribution little is known about the shortnose gar within Montana. The shortnose gar is typically found in large rivers, quiet pools, backwaters, and oxbow lakes. It has a higher tolerance to turbid water than the other four gar species found in North America. Gar also have the unique ability to supply a highly vascularized swim bladder with supplemental oxygen by engaging in a behavior of “breaking,” where air is gulped at the surface (Pflieger 1975). This allows gar to occupy waters with extremely low dissolved oxygen concentrations, which would not be suitable for most other fish inhabitation.

Management

Due to low numbers and poor quality flesh, the shortnose gar is not considered a sport fish in Montana (AFS website 2003). There is no management plan for the shortnose gar in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Limited information in Montana	Consider preparing a management plan for the shortnose gar or include it into other comprehensive taxonomic plans
Limited habitat used in Montana	Increase survey and monitoring efforts
Backwater habitat filled in for agriculture and modified by lack of channel maintenance flows	Increase conservation initiatives for backwater sloughs and channels
Cold water release, lack of turbidity, and artificial hydrograph below Fort Peck Dam may inhibit abundance in the lower Missouri River	Regulate water regimes to be more closely tied to natural water regimes

Management Plan

None

Citations

American Fisheries Society Montana Chapter website: http://www.fisheries.org/AFSmontana/SSCpages/Shortnose%20Gar%20Status.htm

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Pflieger, W. L. 1975. The fishes of Missouri. Missouri Department of Conservation, Jefferson City, MO.

Yellowstone Cutthroat Trout (*Oncorhynchus clarki bouvieri*)

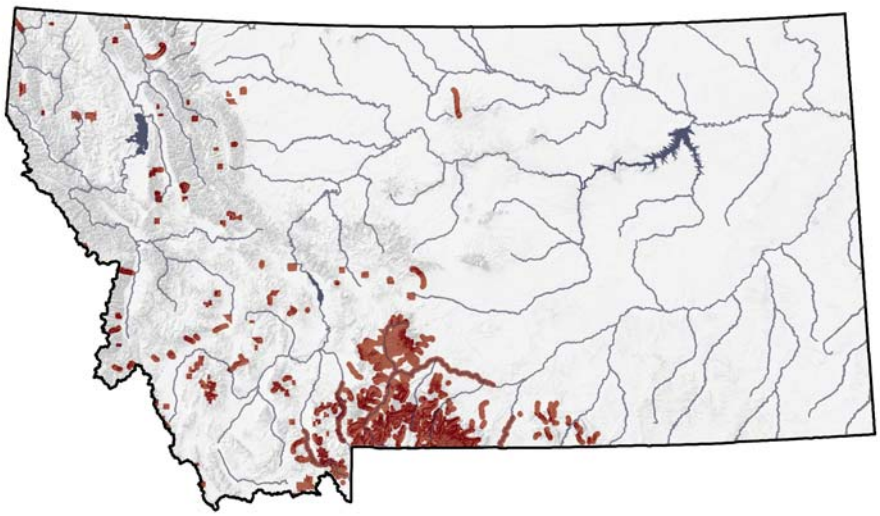

Figure 48. Distribution of the Yellowstone Cutthroat Trout (includes introduced populations)

Range

Historically, the Yellowstone cutthroat trout was believed to have occupied much of the Yellowstone River basin, including portions of the Clarks Fork of the Yellowstone River, Bighorn River, and Tongue River basins in Montana and Wyoming, and parts of the Snake River basin in Wyoming, Idaho, Utah, and Nevada (Behnke 1992). The lower portions of some primary stem rivers (e.g., the Tongue River) may have been too warm to support populations. Range wide, Yellowstone cutthroat trout have undergone substantial declines in distribution and abundance. Populations in Utah and Nevada are limited to one to two basins (May 1996). Based on a survey of biologists, May (1996) concluded that in Idaho, Yellowstone cutthroat trout occupied 43 percent of their historical range, in Wyoming, 42 percent, and in Montana, 32 percent. Most remaining indigenous populations in Montana inhabit headwater streams, though the Yellowstone River primary stem also supports large numbers of this subspecies. More recent estimates suggest that in Montana, 10 percent of the historically occupied fluvial habitat still contains genetically pure populations (May 1998; Anonymous 1999). Yet all these estimates must be regarded as approximations because many waters in its historical range were probably barren of fish because of barriers to upstream migration (May 1996; Dufek et al. 1999). Also, stocking in previously barren waters in historically occupied basins has been commonplace. For example, in Montana only 2 to 6 lakes historically were occupied, whereas more than 100 lakes now support genetically pure Yellowstone cutthroat trout (May 1996; May et al. 1998). Finally, recent comprehensive field surveys of Montana waters are lacking. Similar surveys in northwestern Wyoming outside Yellowstone National Park revealed that of 1,700 kilometers of potential historical

habitat, only 245 kilometers contained reasonably genetically pure Yellowstone cutthroat trout distributed in four populations, all of which had been exposed to introgression with Snake River fine-spotted cutthroat trout (Kruse et al. 2000).

Habitat

Yellowstone cutthroat trout inhabit relatively clear, cold streams, rivers, and lakes. Optimal temperatures have been reported to be from 4 to 15 degrees C., with occupied waters ranging from 0 to 27 degrees C. (Gresswell 1995) (AFS website 2003).

Management

To maintain healthy populations of Yellowstone cutthroat trout and to ensure the wide-ranging persistence of this subspecies in Montana and elsewhere, a number of tactics have been proposed in recent status assessments (Yellowstone Cutthroat Trout Working Group 1994; Gresswell 1995; May 1996; May et al. 1998; Anonymous 1999; Dufek et al. 1999; Wyoming Game and Fish Department 2000). Please refer to these assessments for more information.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Persistence of non-native fish	Continue field surveys and monitioring
	Continue harvest management of non-native trout
Widespread stocking of non-indigenous populations of Yellowstone cutthroat trout	Decrease stocking of non-indigenous Yellowstone cutthroat trout to decrease genetic homogenization
	Decrease stocking of non-native trout
Susceptibility to infection by Myxobolus cerebralis, a European protozoan and the causative agent of whirling disease	Increased funding for studying whirling disease
Tributary dewatering by unsustainable irrigation practices	Decreased channels and irrigation developments
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede fish movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores beneficial fish passage
River channelization or riprap	Work with new stabilization projects to reduce impacts and support efforts to restore existing rip-rap areas to natural condition

Range, forest, or mining management practices	Support government and private conservation activities that encourage and support sustainable land management practices (example; rest and rotation schedules)

Management Plans

Cooperative Conservation Agreement for Yellowstone Cutthroat Trout within Montana between Crow Tribe, Montana Department of Fish, Wildlife & Parks (FWP), Montana Department of Environmental Quality (DEQ), Montana Department of Natural Resources and Conservation (DNRC), USDA Forest Service–Northern Region, Gallatin and Custer national forests, USDI Bureau of Land Management–Montana (BLM), USDI Fish and Wildlife Service (FWS), USDI Bureau of Indian Affairs (BIA), Yellowstone National Park. 2000. Montana Department of Fish, Wildlife & Parks.

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Westslope Cutthroat Trout (*Oncorhynchus clarki lewisi*)

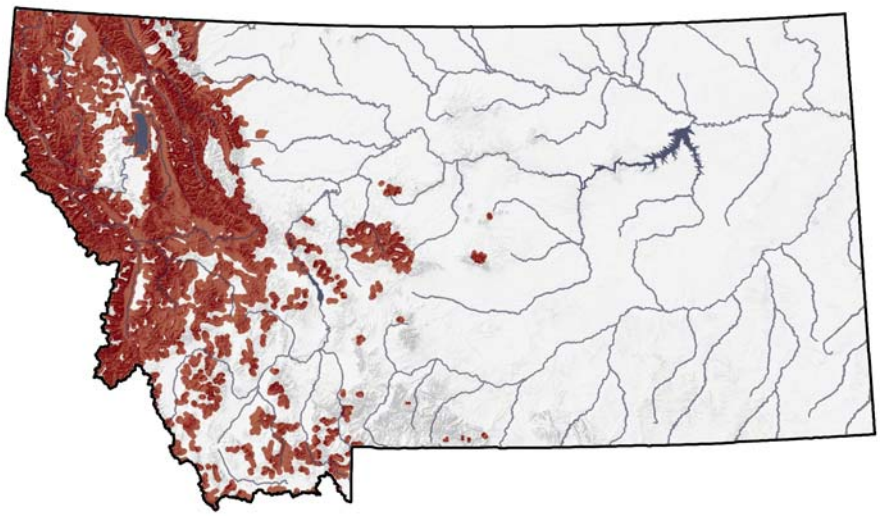

Figure 49. Distribution of the Westslope Cutthroat Trout (includes introduced populations)

Range

The westslope cutthroat trout is found in the Kootenai watershed, the Clark Fork watershed, the headwaters of the Missouri River, and the headwaters of the Saskatchewan River. Westslope cutthroat trout were first described by Lewis and Clark and were once extremely abundant. Unfortunately, the species has lost a lot of ground. Various studies have estimated that the westslope cutthroat trout now only occupies between 19 to 27 percent of its historical range in Montana and about 36 percent of its historical range in Idaho (Van Eimeren 1996). In addition, westslope cutthroat trout can hybridize with other cutthroat trout subspecies and rainbow trout. Thus, genetically pure westslope cutthroat trout are estimated to exist in only 2 to 4 percent of their historical stream distribution (McIntyre and Rieman 1995). East of the Continental Divide, westslope cutthroat trout are confined to headwater reaches, and most of these small populations face an extremely high risk of extinction (AFS website 2003).

Habitat

Spawning and rearing streams tend to be cold and nutrient poor. Westslope cutthroat trout seek out gravel substrate in riffles and pool crests for spawning habitat. Cutthroat trout have long been regarded as sensitive to fine sediment (generally defined as 6.3 millimeters or less). Although studies have documented negative survival as fine sediment increases (Weaver and Fraley 1991), it is difficult to predict their response in the wild (McIntyre and Rieman 1995). This is due to the complexity of stream environments and the ability of fish to adapt somewhat to changes in microhabitat (Everest et al. 1987) (AFS website 2003).

Westslope cutthroat trout also require cold water, although it has proven elusive to define exact temperature requirements or tolerances. Likewise, cutthroat trout tend to thrive in streams with more pool habitat and cover than uniform, simple habitat (Shepard, Pratt, and Graham 1984). Juvenile cutthroat trout overwinter in the interstitial spaces of large stream substrates. Adult cutthroat trout need deep, slow-moving pools that do not fill with anchor ice in order to survive the winter (Brown and Mackay 1995) (AFS website 2003).

Management

Management of this species involves protecting the population strongholds and making tough decisions on restoration priorities for the depressed populations. The state of Montana has altered fishing regulations to reduce fishing mortality. Montana has also developed a conservation agreement signed by nine government agencies and conservation groups (Montana Department of Fish, Wildlife & Parks 1999). This agreement prioritizes protecting genetically pure populations first, then slightly introgressed populations. Recovering depressed populations will involve habitat restoration and the removal of non-native species. To a large degree management activities are different between the state west of the Continental Divide (focus on barriers and non-native trout) and east (focus on habitat restoration). Research suggests that it is not a good idea to bolster populations with stocked fish from other watersheds due to considerable genetic variation between watersheds (Leary, Allendorf, and Kanda 1998). It will be especially challenging to recover migratory individuals. Government agencies will need to work together to share expertise, pool financial resources, and monitor progress toward restoration of this species (AFS website 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss due to range, forest, mining, or agricultural management practices, residential development, and the impact of roads	Conservation of habitat, including better natural resource use practices
Fish spawning habitat loss due to dewatering of streams for irrigation and because of barriers created by dams and road culverts	
Overcompetition and predation by non-native species	Educate the public on need of westslope cutthroat trout
	Increase limits of non-native fish
	Removal of non-native fish where appropriate

Increased hybridization with other species	Continue to conserve genetically pure populations
	Creation of barriers to protect remaining populations
Isolated and small population sizes	Increase stock populations of genetically pure westslope cutthroat trout
	Reintroduction of westslope cutthroat trout
Overfishing	Reduce limits on westslope cutthroat trout

Management Plans

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Columbia Basin Redband Trout (*Oncorhynchus mykiss gairdneri*)

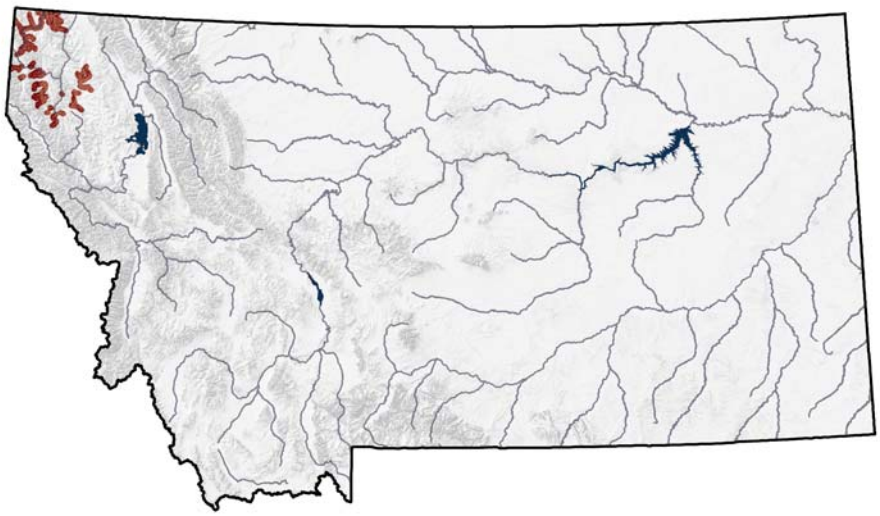

Figure 50. Distribution of the Columbia Basin Redband Trout

Range

The Kootenai River drainage population of the redband trout is Montana's only native rainbow trout and represents the farthest inland penetration of redband trout in the Columbia River Basin. Until recently, the upper distribution of redband trout in the Columbia River Basin was believed to extend upstream to Kootenai Falls, which was considered a barrier falls located approximately 8 kilometers east of Troy, Montana (Allendorf et al. 1980). Recent information suggests that the barrier was not Kootenai Falls, but one that existed in geologic time near the present-day Libby Dam or Fisher River (Hensler et al. 1996).

Presently, populations of redband trout have been identified using starch gel electrophoresis in the following streams in the Kootenai River drainage in Montana: Callahan Creek, North Fork Yaak River and East Fork Yaak River, upper Libby Creek and several tributaries, and several tributaries of the Fisher River including Wolf Creek (Allendorf et al. 1980; Leary et al. 1991; Huston 1995; Hensler et al. 1996; M. Hensler, MFWP, personal communication).

Results of genetic surveys indicate that redband trout historically preferred low-gradient valley-bottom streams throughout the Kootenai River drainage but are presently restricted to headwater areas or streams with barriers. Allendorf et al. (1980) concluded that the redband trout is a native rainbow trout to the Kootenai River in Montana, and that "planting of hatchery rainbow trout has created a situation of tremendous genetic divergence among local populations" (e.g., hybridization).

Kootenai redband trout are effectively separated into two primary regions: those below Kootenai Falls and those above. Fish known to inhabit these streams may mix downstream but are unlikely to traverse up the falls (Chapman 1986). Below Kootenai Falls, redband trout inhabiting Callahan Creek and the upper Yaak River drainage are isolated into two separate regions by Yaak River Falls, a falls-chute barrier located 4 kilometers from the mouth of Callahan Creek, and a barrier falls located in the lower East Fork of the Yaak River. These remnant populations, which are spatially fragmented and isolated from genetic exchange, represent the only known remaining sources of native redband trout capable of refounding their historical distribution in Montana downstream of Kootenai Falls.

There are no barriers to protect redband trout from hybridization upstream of Kootenai Falls. Still, there are several tributaries to the Fisher River drainage and Libby Creek drainage that maintain non- or nearly nonintrogressed populations and could be used for refounding if necessary (M. Hensler, MFWP, personal communication).

Perkinson (1993) hypothesized that of 300 kilometers of habitat originally used by redband trout in Montana, only 100 kilometers (33 percent) of their historical range is presently occupied by a stock that is at least 95 percent pure. More recent genetic evaluation of the species showed that the historical range was more on the order of 1,200 kilometers and current range, 493 kilometers. The current distribution includes instances where redband trout are sympatric with westslope cutthroat trout. These populations show small first-generation hybridization and almost no post-first-generation hybridization. Approximately 152 kilometers, or 13 percent, of the historical distribution remains as sources of native redband trout due to barriers in the Callahan Creek and Yaak River drainages.

Habitat

The seasonal habitat requirements of redband trout in the Kootenai River drainage in Montana were investigated during 1997 and 1998 (Hensler and Muhlfeld 1999; Muhlfeld 1999; Muhlfeld et al. 2001 in-press). Summer results demonstrated that juvenile (36 to125 mm) and adult (less than 126 mm) redband trout prefer deep microhabitats (more than 0.4 m) with low to moderate velocities (less than 0.5 m/s) adjacent to the thalweg. Conversely, age-0 (less than 35 mm) redband trout select slow water (less than 0.1 m/s) and shallow depths (less than 0.2 m) located in lateral areas of the channel. All ages of redband trout strongly selected pools and avoided riffles; runs were used generally as expected (based on availability) by juveniles and adults and more than expected by age-0 redband trout. At the macrohabitat scale, a multiple regression model indicated that low-gradient, midelevation reaches with an abundance of complex pools are critical areas for the production of redband trout. Mean reach densities ranged from 0.01 to 0.10 fish/m^2. During the fall and winter period, adult redband trout occupied small home ranges and found suitable overwintering habitat in deep pools with

extensive amounts of cover in headwater streams. In Basin Creek, adult redband trout commenced spawning (e.g., redd construction) during June as spring flows subsided following peak runoff. Redband trout generally selected redd sites in shallow pool tail-out areas (mean depth = 0.27 m; range: 0.20 to 0.46) with moderate water velocities (mean velocity = 0.50 m/s; range: 0.23 to 0.69 m/s) dominated by gravel substrate.

Management

Long-term conservation and management of this subspecies will require state and federal agencies to develop a comprehensive plan to protect and restore redband trout throughout their native range in Montana. Montana Fish, Wildlife & Parks (MFWP) and the U.S. Forest Service and local conservation groups have scheduled future habitat improvement and conservation efforts for the foreseeable future.

Another objective should be the consideration of reintroductions throughout the Kootenai River drainage in the redband trout's historical range. To that end, MFWP is in the process of assessing redband trout performance at the Libby Field Station and Murray Springs State Fish Hatchery and in two lakes (M. Hensler, personal communication). Reintroduction efforts should be implemented with caution. Introduction of a species to any aquatic habitat requires many considerations because species interactions are complex and difficult to predict (Li and Moyle 1981). Results of microsatellite analyses based on allozyme electrophoresis of several populations of redband trout in Montana and British Columbia indicate significant differences between watersheds and relatively small differences between populations within watersheds (Knudsen et al. 2002). In order for potential reintroduction programs to be genetically rational, drainage-specific stocks are needed for successful recovery programs.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Range and forest management practices, which include use of pesticides	Reduce stream intake of pesticides and herbicides
	Management of riparian zones and waters where redband trout reside
Culverts, dams, irrigation diversions, and other instream barriers that fully or partially impede movement and reduce connectivity of habitat	Removal or modification of barriers in a manner that restores beneficial fish passage

	Consider preparing a management plan for the Columbia Basin redband trout or include it into other comprehensive taxonomic plans
Hybridization	Reduce stocking of non-native trout in sensitive areas
	Protect genetic composition by raising hatchery Columbian Basin redband trout
Geographical restricted range	Consider reintroduction efforts
	Habitat surveys in areas where reintroduction efforts could occur

Management Plan

None

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Bull Trout (*Salvelinus confluentus*)

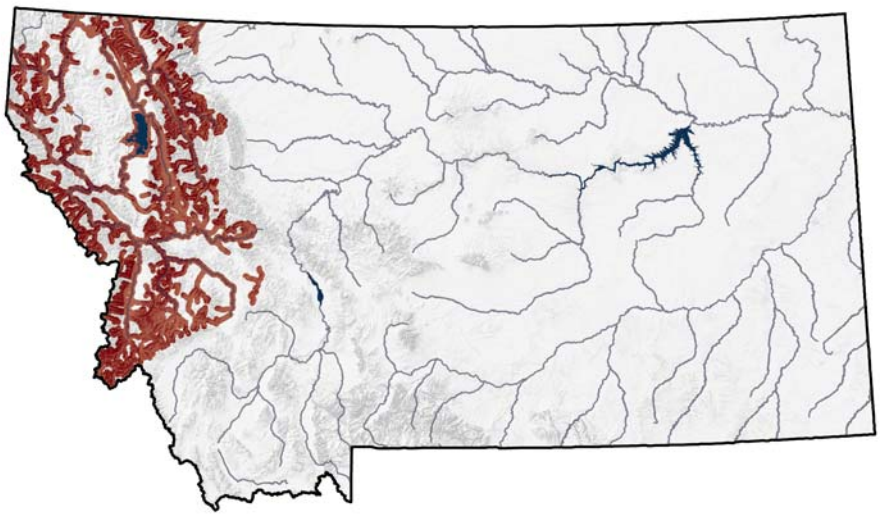

Figure 51. Distribution of the Bull Trout

Range

Montana populations of the bull trout are limited to the Columbia River and Saskatchewan River basins. Major bull trout drainages are the Kootenai River and Clark Fork River (including Bitterroot, Flathead/Swan and Blackfoot systems). Metaline Falls (Tom Weaver, FWP, personal communication) and Bonnington Falls have isolated the Clark Fork River and Kootenai River populations from downstream Columbia Basin populations for approximately 10,000-plus years (Montana Bull Trout Restoration Team (MBTRT) 2000). The St. Mary's River in the Saskatchewan basin, draining north into Canada, contains the only bull trout populations east of the Continental Divide in the United States.

Habitat

Subadult and adult fluvial bull trout reside in larger streams and rivers and spawn in smaller tributary streams, whereas adfluvial bull trout reside in lakes and spawn in tributaries. They spawn in cold headwater streams with clean gravel bottoms (Brown 1971; Holton 1981).

Management

Several studies report bull trout local population genetic divergence down to the geographic scale of adjacent tributaries (Leary et al. 1993; Kanda et al. 1997; Spruell et al. 1999; Taylor et al. 1999). Based on similar patterns of population genetic structure in steelhead, Parkinson (1984) suggested that populations in geographically adjacent streams be managed as separate stocks.

Because of their opportunistic feeding habits and late maturity, bull trout are vulnerable to overharvest and poaching/accidental harvest, especially during spawning migrations and when in tributaries (Leathe and Enk 1985; Long 1997; Schmetterling and Long 1999; Carnefix 2002). Some Montana bull trout populations (e.g., Swan, South Fork Flathead, Kootenai, and Blackfoot rivers) have responded well to more restrictive angling regulations or closures (Tom Weaver, FWP, personal communication), and initial conservation efforts in Montana focused on such measures. The first minimum length limit was imposed in 1951 (Long 1997). From 1953 to 1972, 11 of 33 major North and Middle Fork Flathead River spawning tributaries were closed to fishing, and an 18-inch minimum size limit was established in 1982 to protect pre-spawners in the rivers and Flathead Lake (Fraley et al. 1981; Deleray et al. 1999). Regulations closing all state waters except Swan Lake and the Hungry Horse Reservoir to intentionally fishing for and/or harvesting bull trout became effective in 1993 (Deleray et al. 1999). Harvest is currently permitted in Swan Lake, the Hungry Horse Reservoir (South Fork Flathead), and the Koocanusa Reservoir (Kootenai). Some level of poaching (Swanberg 1996; Long 1997) and accidental harvest due to misidentification (Schmetterling and Long 1999) probably continues to impact bull trout populations, but it is difficult to detect, quantify, prosecute, or prevent. Recent efforts to reduce misidentification include a bull trout identification and education webpage at the FWP website (http://fwp.state.mt.us/bulltroutid/default.htm).

The state of Montana began development of a bull trout restoration plan in 1993. The final plan, published in June 2000, identifies 115 bull trout core areas and connecting “nodal habitats” within 12 restoration/conservation areas (RCAs); sets goals, objectives, and criteria for restoration; outlines actions to meet those criteria; and establishes a structure to monitor implementation and evaluate effectiveness of the plan. The stated goal of the plan is “to ensure the long-term persistence of complex (all life histories represented), interacting groups of bull trout distributed across the species’ range and manage for sufficient abundance within restored RCAs to allow for recreational utilization” (MBTRT 2000). Bull trout conservation is also a stated goal of the Plum Creek Timber Company’s Native Fish Habitat Conservation Plan (HCP) (http://www.plumcreek.com/environment/HCP-fish.cfm), for which agreement was reached with the U.S. Fish and Wildlife Service (USFWS) in October 2000. Though approved, this HCP/take permit is currently in litigation.

With a “threatened” listing (USFWS 1998), USFWS has separate responsibility under the Endangered Species Act for development of a federal recovery plan and designation of critical habitat. A draft recovery plan built on the foundation of state restoration plans (USFWS 2002a, Internet-accessible at http://pacific.fws.gov/bulltrout/recovery/Default.htm) and proposed critical habitat (USFWS 2002b, http://pacific.fws.gov/bulltrout/criticalhab.htm) was released. Although all bull trout within the United States are now listed as threatened, this draft recovery plan and proposed critical habitat are organized hierarchically by

“local populations” within “core areas” within “recovery subunits” within 24 “recovery units” within three (of five) designated “distinct population segments” (DPSs). The draft recovery plan covers the Klamath basin, Columbia River, and St. Mary-Belly River DPSs. Although extensive bull trout habitat was proposed for critical designation in Montana, including 5,341 stream kilometers (3,319 miles) and 88,051 hectares (217,577 acres) of lake and reservoir, the final critical habitat designation did not include any habitat in Montana. Ten local populations within four core areas have been identified within the Kootenai River Recovery Unit in Montana. About 119 local populations distributed among 36 core areas within three recovery subunits (Flathead, Upper Clark Fork, and Lower Clark Fork) are identified within Montana in the Clark Fork Recovery Unit. Nine local populations within six core areas are identified within Montana in the St. Mary-Belly River Recovery Unit.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat degradation and loss due to land and water management practices	Restoration of degraded habitat and preservation of existing healthy habitat
Loss of the migratory component of bull trout life history diversity by isolation and fragmentation of populations by both structural (e.g., dams) and environmental (e.g., thermal or pollution) barriers	Reestablish connectivity between habitats isolated by constructed barriers
Introduction of non-native fishes resulting in competition, predation, and hybridization threats	Increased management of non-native fishes
	Prevent illegal introductions of fish species
Historical overharvest and eradication efforts	Management of water bodies from overfishing
Ongoing poaching and accidental harvest due to misidentification	Education of what bull trout look like and where they are distributed

Management Plans

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Lake Trout (native lakes) (*Salvelinus namaycush*)

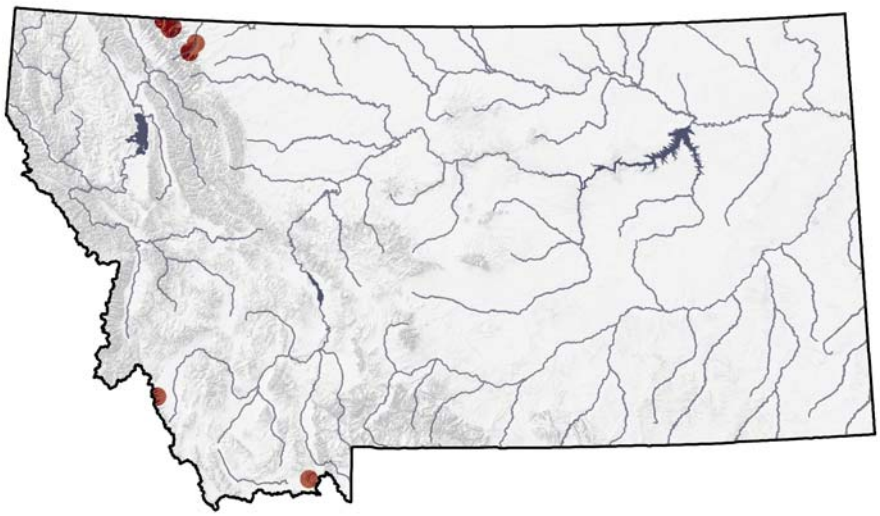

Figure 52. Distribution of Native Populations of Lake Trout

Range

Montana's native lake trout populations remain in Waterton Lake, Glenns Lake, Cosley Lake, and St. Mary Lake in Glacier National Park, and Lower St. Mary Lake in the Blackfeet Indian Reservation. All of these waters are in drainages that eventually reach the Hudson Bay. Other native populations occur in Twin Lake in the Big Hole River drainage and Elk Lake in the Red Rock River drainage, both tributaries to the upper Missouri River drainage. Although there are records of some stocking of lake trout into Cosley, Glenns, and Lower St. Mary lakes, mtDNA analysis by Wilson and Hebert (Wilson and Hebert 1998) gives evidence of the native status of the listed populations. Other lake trout populations in Montana are the result of legal and illegal introductions and are not remnant native populations.

Habitat

While the lake trout can be found in cold rivers and shallow lakes in the northern portion of its range (Scott and Crossman 1973) in Montana, native lake trout inhabit a few deep, cold lakes remaining from the Pleistocene glaciations. Lake trout prefer water temperatures in the 50- to 57-degree F range and, therefore, spend most of their lives in the deeper, benthic habitats with these water temperatures. Lake trout can occasionally be found in shallow water habitats, usually immediately after ice-out when surface waters are within their preferred temperature range. They spawn in the fall on the rocky substrate of the shoreline. Lake trout scatter or broadcast their spawn, a rarity in the trout group.

Management

Management recommendations within this document pertain only to the Elk Lake and Twin Lake populations. Little is known about the status of Montana's native lake trout populations. The populations in Waterton, Cosley, Glenns, and St. Mary lakes are afforded the protection of their location within Glacier National Park. The Waterton population is believed to be abundant and stable. (Leo Marnell, NPS, personal communication).

St. Mary Lake is a 3,500-acre lake at 4,473 feet above mean sea level. The St. Mary Lake population is believed to be abundant and stable. Lake trout are the most dominant fish species after lake whitefish. There are records of stocking lake trout into St. Mary Lake, so the genome of this population may contain exotic alleles. DNA analysis has been performed, but not reported, to identify the source stock for these introductions (Leo Marnell, NPS, personal communication; Robbin Wagner, USFWS, personal communication).

Some question whether the Glenns and Cosley lakes populations are native due to the location of a downstream high-barrier falls (Leo Marnell, NPS, personal communication). Holton and Johnson (1996) did not list these as native populations; however, Wilson and Hebert (1998) found that there is genetic evidence that the Cosley Lake haplotype is consistent with the other populations that formed the Alberta/Montana refuge. The Cosley and Glenns lakes populations also are believed to be stable. There are records of stocking lake trout of unknown origin into Cosley and Glenns lakes, so the genome of these populations may contain exotic alleles. DNA analysis has been performed, but not reported, to identify the source stock for these introductions (Leo Marnell, NPS, personal communication; Robbin Wagner, USFWS, personal communication).

Lower St. Mary Lake is located within the Blackfeet Indian Reservation. This population is stable and abundant. Lake trout are the most dominant fish species after lake whitefish and comprise 10 to 30 percent of the commercial lake whitefish catch. Again, there are records of stocking lake trout of unknown origin into Lower St. Mary Lake. Water level fluctuations and dewatering due to lake management for irrigation impacts this population (Robbin Wagner, USFWS, personal communication).

Elk Lake is a 283-surface-acre lake at 6,674 feet elevation with a maximum depth of 70 feet (USFS 2004). The lake trout population in Elk Lake is small (250 to 1,000 fish) and declining. This population has a poor age structure due to limited recruitment (Oswald, unpublished FWP data).

Twin Lake is a 75-surface-acre lake at 7,235 feet elevation with a maximum depth of 72 feet (USFS 2004). The Twin Lake population is also small (50 to 250 fish) and declining, with little recruitment (Oswald, unpublished FWP data).

The genetic uniqueness and significance of Montana's lake trout populations to the postglacial distribution of the species mandate that these remnant native populations be conserved.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Little information on native populations	Consider preparing a management plan for the lake trout (native lakes) or include it into other comprehensive taxonomic plans
Irregular recruitment	Increased monitoring and surveying
Genetic bottlenecks caused by small size of remaining populations	Reintroduce genetically pure native populations
Limiting factors unknown	Identify and remedy limiting factors

Management Plan

None

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Arctic Grayling (Thymallus arcticus)

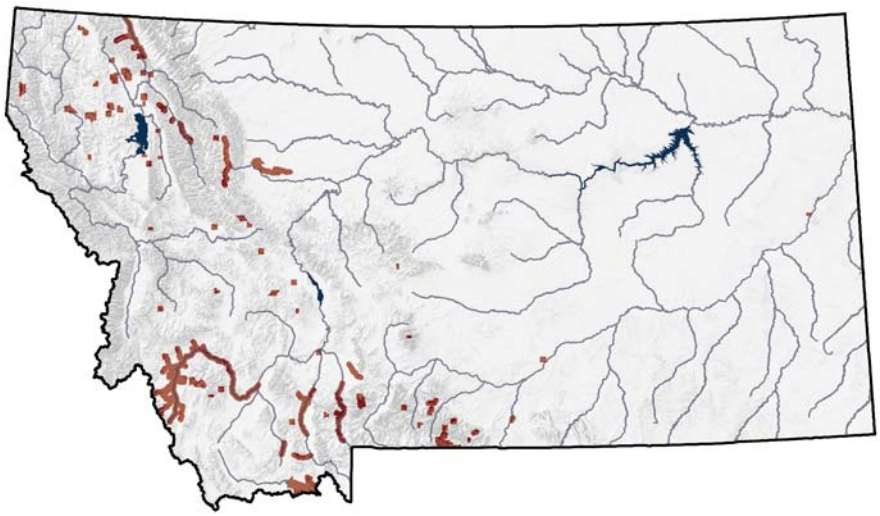

Figure 53. Distribution of the Arctic Grayling (includes introduced populations)

Range

At the end of the 19th century, fluvial arctic grayling were intermittently distributed throughout the upper Missouri drainage above Great Falls (Vincent 1962). During the 20th century, the range of fluvial arctic grayling has been restricted to the Big Hole River of southwest Montana, about 4 percent of its native range (Kaya 1992a). Vincent (1962) attributed the decline of fluvial arctic grayling throughout their native range to four factors: habitat degradation, introduction of non-native salmonids, climatic change, and exploitation by anglers.

Habitat

The arctic grayling occurs in both ponds/lakes as well as riverine systems; however, these differences make two distinct populations of either adfluvial or fluvial populations. Cool temperatures are needed to sustain populations, and a gravelly substrate is needed for breeding purposes.

Management

The Fluvial Arctic Grayling Workgroup (FGW) developed a plan to research, protect, and restore fluvial arctic grayling (FGW 1995). A primary objective was to develop a brood stock from wild Big Hole River arctic grayling to preserve their genetic identity. Gametes were collected from spawning arctic grayling in the Big Hole River between 1988 and 1992 until a sufficient founding population was represented (Leary 1991). Progeny of the brood stock with genetic diversity equivalent to the wild stock were available in 1995. Arctic grayling derived from

the brood may be used to augment the Big Hole River population, if necessary, and to reestablish other populations within their native range.

Another objective of FGW is to expand the range of fluvial arctic grayling beyond the Big Hole River basin. Kaya (1992b) identified streams suitable for reintroductions of fluvial grayling. Experimental reintroductions have occurred in Cougar Creek, Yellowstone National Park, and in the West and East Gallatin rivers using progeny of the brood stock. Intensive reintroduction efforts in 1997 for the Ruby River of southwestern Montana and the Firehole and Gibbons rivers in Yellowstone National Park occurred and are being monitored at this time.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Low flows during severe drought decrease survival of older arctic grayling due to high water temperatures, increased susceptibility to predation, and diminished habitat volume	Riparian rehabilitation projects to identified degraded habitats on the Big Hole River
Displacement by non-native rainbow and brook trout	Less stocking of non-native fish
Arctic grayling are easily caught by anglers and are susceptible to overharvest	Increased management of harvest
Riparian vegetation and streambanks effected by range or forest management practices, mass willow removal, and dewatering of the river for agricultural uses have negatively impacted fish habitat	Support management of grazing to maintain riparian vegetation and streambank and channel stability in excellent condition
Blockage of fish passage by irrigation diversions	Decreased water runoff for irrigation purposes to increase stream volumes

Management Plans

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Sturgeon Chub (*Hybopsis gelida*)

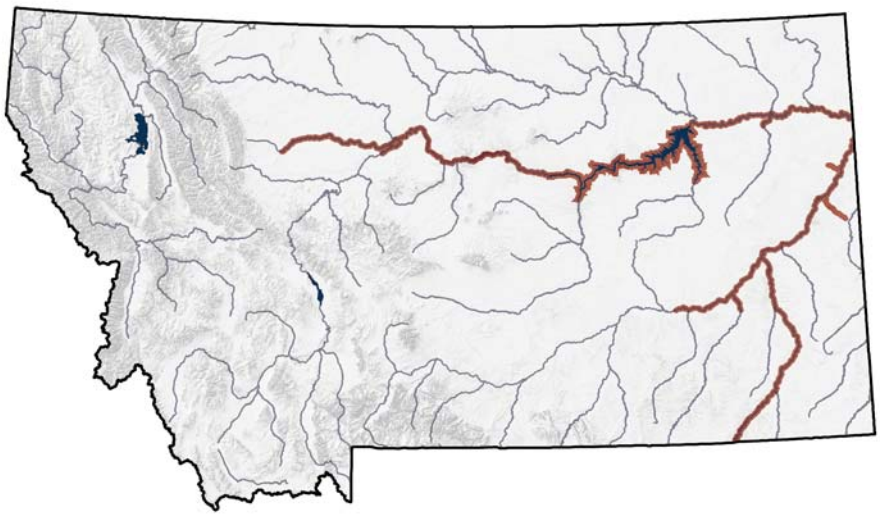

Figure 54. Distribution of the Sturgeon Chub

Range

The sturgeon chub is indigenous to the Missouri-Mississippi river basins from Montana to Louisiana (Lee et al. 1980; Werdon 1993). Historically, sturgeon chub have been collected in small numbers from only a few locations in Montana, so the Montana Department of Fish, Wildlife & Parks designated it a state species of special concern more than two decades ago (Holton 1980). Werdon (1993) reported the sturgeon chub was in possible danger of extinction over much of its former range, including all relevant Montana waters except the Powder River. However, recent collections of this species show it is more widespread and abundant than previously understood. Prior to 1975 only four collections of sturgeon chub from Montana were known. The first collection was taken from an unknown site on the Milk River (Girard 1856), and three collections were reported more than 100 years later from the Yellowstone River drainage (Bailey and Allum 1962; Brown 1971). Collections from 1975–1982 determined that chubs were also present throughout the Powder River (Rehwinkle 1978), in the lower Tongue River (1980), and in the lower Teton and the middle Missouri rivers (Gardner and Berg 1982).

Between 1990 and 1995, collections verified the persistence of sturgeon chub in much of their previously known range and established major range extensions. Sturgeon chub are still present in the Powder River (Werdon 1993; Gould 1994), Lower Yellowstone River (Werdon 1993; 1994 MSU collections by Bramblett et al.), and middle Missouri River (1994 MSU collections by Gardner and Grisak). Furthermore, collections from 1993 to 1995 have yielded significant up- and downstream range extensions in the lower Yellowstone (MSU collections by Bramblett et al.; Ruggles 1997; Stewart 1994), middle Missouri (MSU collections by

Gardner and Grisak), and the lower Missouri rivers (Tews 1993; Ruggles 1997). In total, sturgeon chub recently have been found over some 650 kilometers in three Montana rivers (Gould 1994). However, sampling has not been able to establish their continued existence in the lower Teton and Milk rivers (Gould 1994).

Habitat

Sturgeon chub are highly adapted to life in turbid waters. They have small eyes and many external papillae on their bodies and fins, probably to aid in locating food (Cross 1967; Pflieger 1975). Chub are most closely associated with sites having moderate currents and depths and sand or rock substrates (Baxter and Simon 1970; Brown 1971; Lee et al. 1980). In the Powder River, sturgeon chub were taken most frequently at sites with depths less than 51 cm and depth velocities of less than 90 cm/s at 0.6 depth (Stewart 1981; Werdon 1992; Gould unpublished data).

Management

No management plan for this species exists in Montana. Recommendations for operating reservoir and irrigation projects should be developed for improving and maintaining sturgeon chub populations and habitats in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes	Conservation practices on large rivers in eastern Montana
Channelization of the Missouri River due to irrigation operations and development	Support sustainable irrigation projects
Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increased monitoring and survey efforts in eastern Montana designed to monitor population trends and range expansion or loss and collect additional information on life history and ecology
Removal of wild individuals used for bait fish	Educate the public on the necessity of native species
Predation by non-native fish	Consider preparing a management plan for the sturgeon chub or include it into other comprehensive taxonomic plans
Low stream flows probably have eliminated some peripheral sturgeon chub populations in smaller streams	Repopulate smaller tributaries such as Teton, Milk, and Tongue rivers to establish periphery populations

Management Plan

None

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Sicklefin Chub (*Hybopsis meeki*)

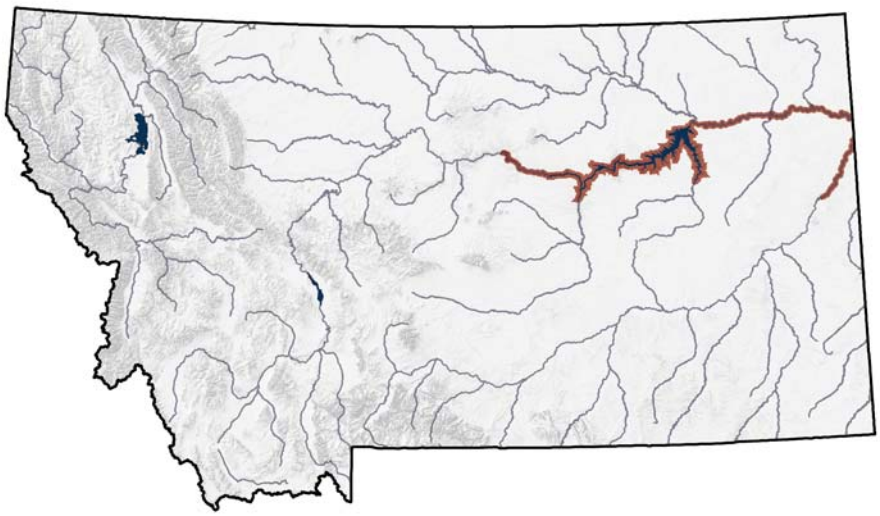

Figure 55. Distribution of the Sicklefin Chub

Range

The first observation of sicklefin chub in Montana was in 1979 in the middle Missouri River upstream of Fort Peck Reservoir (Gould 1981; Gardner and Berg 1982). Until this time they were unknown to exist in the state most likely because of the lack of sampling efforts in eastern Montana. At present, the distribution of sicklefin chub in Montana includes the middle Missouri River from Cow Island downstream to the headwaters of Fort Peck Reservoir (Grisak 1996), the lower Missouri River from the mouth of the Redwater River to the Yellowstone River confluence (Liebelt 1996), and the lower Yellowstone River, from the Intake Diversion Dam to the confluence with the Missouri (Ruggles 1997). As of 1997, the known range of sicklefin chub encompasses nearly 280 kilometers of river in the Missouri and Yellowstone drainages.

Habitat

Spawning occurs in primary channel areas of the large turbid rivers that sicklefin chub inhabit. The spawning period is during the summer months and probably occurs over a wide time span, similar to other big river species. Young-of-the-year sicklefin chub have never been collected, and their early life history remains a mystery. Although the species has been sampled from shallow water and a rocky substrate, there seems to be a general preference for deeper water and a sandy substrate. Unlike the sturgeon chub, all of the Montana captures have been from only the Missouri and Yellowstone rivers, indicating a strong preference for large, turbid rivers.

Management

No management plan for this species exists in Montana. The lack of proper monitoring of these populations could lead to their demise by virtue of not recognizing if and when they are in jeopardy of becoming extirpated by any artificial or natural entity. Recommendations for operating reservoir and irrigation projects should be developed for improving and maintaining sicklefin chub populations and habitats in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat alteration by dam operations, reducing turbidities and/or altering temperature and flow regimes	Conservation practices on large rivers in eastern Montana
Channelization of the Missouri River due to irrigation operations and development	Support sustainable irrigation practices
Decreased range and abundance of prey aquatic insect larvae due to dam construction and snag removal	Increased monitoring and survey efforts in eastern Montana designed to monitor population trends and range expansion or loss and collect additional information on life history and ecology
Removal of wild individuals used for bait fish	Educate the public on the necessity of native species
Predation by non-native fish	Consider preparing a management plan for the sicklefin chub or include it into other comprehensive taxonomic plans

Management Plan

None

Citations

Bicknell, William. 2001. USFWS Federal Registry. Notice of 12-month petition finding to list the sicklefin chub (*Macrhybopsis meeki*) and the sturgeon chub (*Macrhybopsis gelida*) as endangered. 3425 Miriam Avenue, Bismarck, ND 58501. 10 pp.

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Pearl Dace (*Margariscus margarita*)

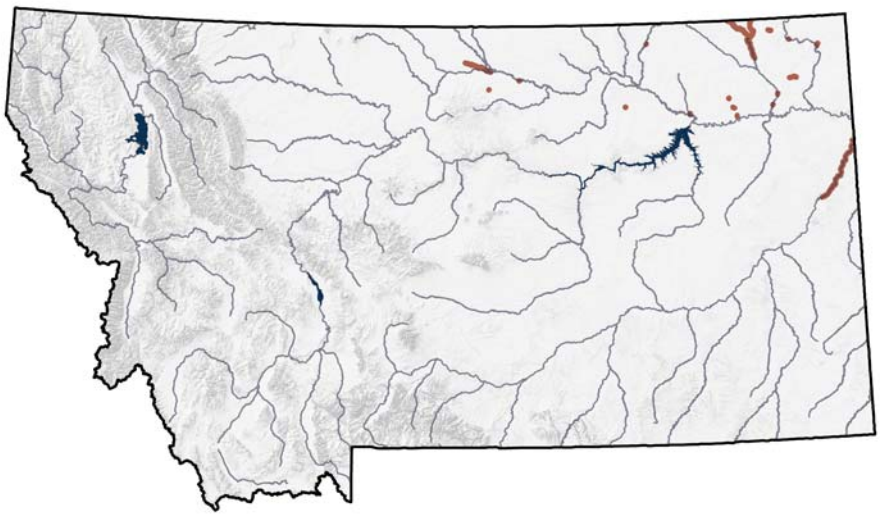

Figure 56. Distribution of the Pearl Dace

Range

Montana contains the southwestern periphery of the continental range of the pearl dace. In Montana, pearl dace occur only in the Missouri River and Saskatchewan River basins. Most known pearl dace localities are in south-flowing tributaries to the Missouri River downstream of its confluence with the Milk River, in the Milk River drainage, or on the Blackfeet Indian Reservation in Glacier County and in Glacier National Park (Schultz 1941; Gould and Brown 1968; Brown 1971; Holton and Johnson 2003; Stash 2001; Bramblett, unpublished data; Robbin Wagner, U.S. Fish and Wildlife Service, personal communication, January 2004).

Two previously reported localities for pearl dace in the lower Yellowstone River (Gould and Brown 1968; Brown 1971; Holton and Johnson 2003) were probably attributable to misidentified creek chubs. The Gould and Brown (1968) collection was reexamined, and the putative pearl dace was found to be a creek chub (William R. Gould, Montana State University, personal communication, January 2004). Other surveys have failed to find pearl dace in the Yellowstone River basin in Montana (Elser et al. 1980; Bramblett, unpublished data). Pearl dace appear to be a glacial relict in Montana, as they are most commonly found in formerly glaciated portions of the plains regions.

Habitat

Pearl dace occur in lakes, cool bog ponds, creeks, and cool springs (Scott and Crossman 1973). Little habitat-related information exists for this species in Montana. At four stream locations where pearl dace were captured in

northeastern Montana, average stream widths ranged from 5.4 to 11.8 meters, average thalweg depths ranged from 0.4 to 1.4 meters, substrates ranged from 53 to 100 percent fine substrate (less than 0.06 mm), and aquatic macrophytes were sparse to very heavy (less than10 to more than 75 percent coverage; Bramblett, unpublished data). Eleven fish species were associated with pearl dace in seven collections from four sites on four Montana streams.

Pearl dace appear to prefer cool to cold water temperatures. In Canada, pearl dace were more often found to co-occur with brook trout (*Salvelinus fontinalis*) and mottled sculpin (*Cottus bairdi*) at water temperatures of 15.8 to 16.6 degrees C than with smallmouth bass (*Micropterus dolomieu*) and rock bass (*Ambloplites rupestris*) at 20.8 to 21.5 degrees C (Becker 1983). The upper lethal temperature for pearl dace was found to be 31.1 degrees C (Becker 1983). In the southernmost part of their range in Maryland and Virginia, pearl dace were found in streams that were cool in summer and warm in winter, with substantial spring-water input (Tsai and Fava 1982). In Montana, pearl dace were captured in streams with daytime water temperatures from July through September ranging from 9.6 to 23.1 degrees C (Bramblett, unpublished data).

Management

Montana Fish, Wildlife & Parks classifies the pearl dace as a species of special concern. The primary management task is to monitor the status of the species in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Limited distribution in Montana renders it vulnerable to extirpation from the state	Consider preparing a management plan for the pearl dace or include it into other comprehensive taxonomic plans
	Fish surveys supported by voucher specimens should be conducted in streams across the range (including areas of historical records) of the species to better determine its geographic range
Populations vulnerable to predation and competition	Reduce stocking of non-native fish (especially pike) that may compete or prey on this species
Collected by anglers seeking bait minnows	Educate anglers of importance of native fish

Anthropogenic stressors that increase water temperatures	Conservation of prairie streams to include less livestock use, increase riparian quality, and decrease fertilizers and nutrients used

Management Plan

None

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Blue Sucker (*Cycleptus elongates*)

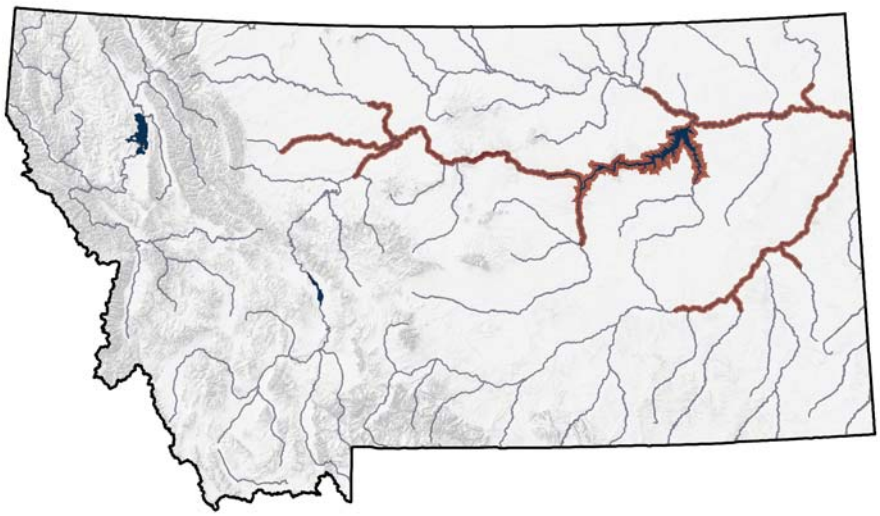

Figure 57. Distribution of the Blue Sucker

Range

In Montana, blue suckers are found in the Missouri River as far upriver as Morony Dam near Great Falls and in the Yellowstone River upriver of Forsyth. During their spawning season, blue suckers have been found in many of the major tributary streams. There have been very few blue suckers sampled in Fort Peck Reservoir, indicating their avoidance of lake environments (AFS website 2003).

Habitat

The blue sucker is adapted for life in swift currents with high turbidity. This fish prefers swift current areas of large rivers, feeding on insects in cobble areas (Moss et al. 1983). In the spring blue suckers migrate upriver and congregate in fast rocky areas to spawn. Large numbers have been observed migrating up tributary streams to spawn. The Tongue, Marias, Milk, and Teton rivers are the tributary streams most heavily used.

Management

Management of the blue sucker consists primarily of routine monitoring of population status and habitat protection. Currently, there is no management plan for blue suckers in Montana. The blue sucker is considered an indicator species for ecotype health because of its habitat-specific requirements. Current monitoring information indicates the populations are in stable condition.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat changes and fragmentation caused by large dams that block passage to spawning grounds, alter stream flow, and eliminate peak flows that initiate spawning runs. Dams also discharge cold, clear water as opposed to the warm, turbid waters in which these species evolved	Consider preparing a management plan for the blue sucker or include it into other comprehensive taxonomic plans
	Regulate water regimes to be more closely tied to natural water regimes
Channelization of large lotic systems	Protect natural minimum instream flow reservations
Changes in riparian habitat and less regeneration of woody trees and understory	Continue conservation of habitats by managing grazing in riparian areas

Management Plan

None

Citations

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Trout-perch (*Percopsis omiscomaycus*)

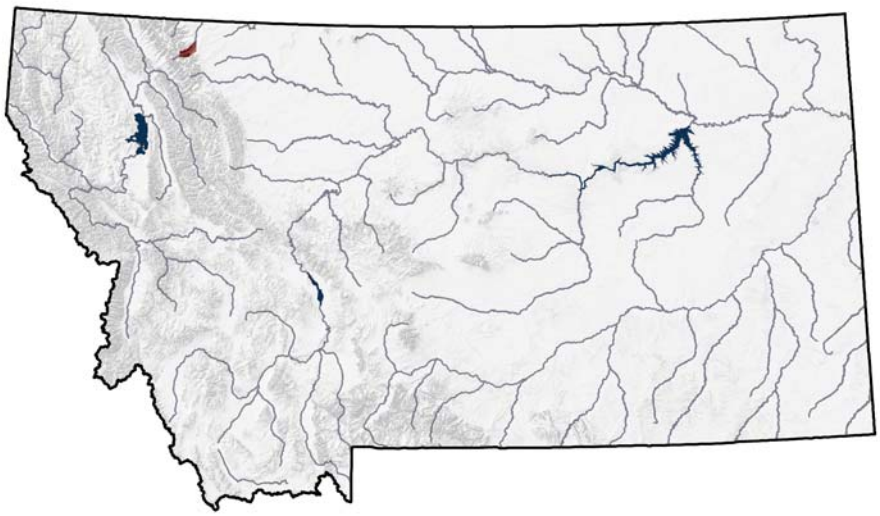

Figure 58. Distribution of the Trout-perch

Range

In Montana, the trout-perch occurs in the South Saskatchewan River basin, which drains northeastern Glacier National Park and the northwestern portion of the Blackfeet Indian Reservation. Trout-perch were not reported in Montana until 1968 (Gould 1969), and the only Montana collection records are from Lower St. Mary Lake (Gould 1969; Brown 1971) and the associated St. Mary canal (Holton and Johnson 1996). Trout-perch have not been reported in other areas of the South Saskatchewan River basin in Montana, such as the Belly River and Waterton Lake, but they may occur there, as this basin has not been surveyed extensively (Brown 1971; L. Marnell, National Park Service, personal communication, 2000). Moreover, trout-perch are commonly collected in the Belly River and Waterton Lake systems in Alberta (T. Clayton, Alberta Environment, unpublished data, 2001). Trout-perch have also been captured in the Milk River in Alberta (T. Clayton, Alberta Environment, unpublished data, 2001). The Milk River basin is outside of the trout-perch's native range. Trout-perch apparently gained access to the Milk River basin via the St. Mary canal, which connects the St. Mary River system with the North Fork Milk River.

Habitat

In Montana, trout-perch are regularly captured in Lower St. Mary Lake and the St. Mary canal using backpack and boat electrofishing (R. Wagner, U.S. Fish and Wildlife Service, personal communication, 2000). In the lake they are associated with large rocky cover and are not captured over sandy or silty substrates. During daylight periods they appear to use rocks as hiding cover, while at night they are out of, but in close proximity, to rocky cover. In the St. Mary canal, trout-

perch have been captured in winter after the canal headgate is closed. In the canal, trout-perch are found in residual pools associated with large rocky cover or concrete riprap (R. Wagner, U.S. Fish and Wildlife Service, personal communication, 2000). Scott and Crossman (1973) report that trout-perch are typically a lake species in eastern Canada, but that they also occur in streams, including somewhat turbid streams, in western Canada. Trout-perch are reported to undergo diel migrations into shallower inshore waters of lakes at night (Brown 1971; Eddy and Underhill 1974; Becker 1983; Nelson and Paetz 1992).

Management

Montana Fish, Wildlife & Parks classify trout-perch as a nongame wildlife species. They are too small to be sought by anglers. The entire known range of trout-perch in Montana is within Glacier National Park and the Blackfeet Indian Reservation. Neither entity has a specific management program for trout-perch.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Sensitive to pollution and sedimentation associated with row crop agriculture, as well as channelization	Consider preparing a management plan for the trout-perch or include it into other comprehensive taxonomic plans
	Conservation of riparian areas, including increased restrictions on fertilizers and nutrients seeping into waters
Sensitive to warm water temperatures	Surveys in the Belly River and Waterton Lake in Montana are needed to establish the presence of trout-perch in these waters
Impoundments restricting proper movement of populations	Manage irrigation and development to improve connectivity of habitat

Management Plan

None

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Burbot (*Lota lota*)

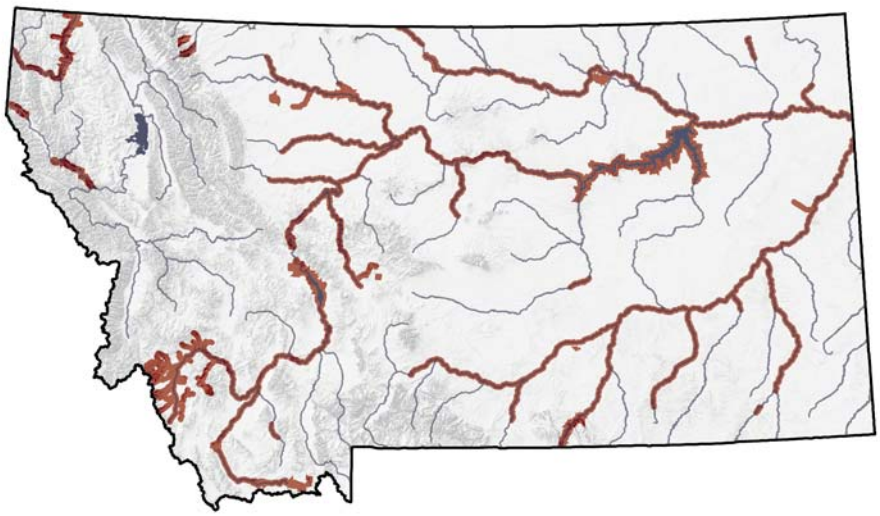

Figure 59. Distribution of the Burbot

Range

Burbot are found in all three major river drainages in Montana (Clark Fork, Missouri, and Yellowstone). Burbot, also known as ling, are usually found in larger streams and cold, deep lakes and reservoirs.

Habitat

Burbot habitat includes large rivers and cold, deep lakes and reservoirs. In lakes, they are mostly associated with bedrock and rubble substrates (Edsall et al. 1993). If soft substrates are present, burbot may construct burrows (Boyer et al. 1989). River requirements are less understood, but some believe they were originally restricted to backwater areas of cooler high-altitude systems (McPhail and Paragamian 2000).Their long cylindrical shape and poor swimming ability prevents them from inhabiting high current areas (Jones et al. 1974). Most spawning is believed to occur in lakes (Scott and Crossman 1973; McPhail and Paragamian 2000); however, reproduction may also occur in rivers and streams (Cahn 1936; Arndt and Hutchinson 2000; Paragamian 2000). They spawn in shallow water, usually in rocky areas.

Management

Burbot management was once poorly understood or nonexistent (McPhail and Paragamian 2000). However, with the completion of a new status paper (Jones-Wuellner and Guy 2004) and routine surveys in the Missouri River by Fish, Wildlife & Parks, we are beginning to have a better grasp on biological information for burbot. The burbot population in the Kootenai River below

Kootenai Falls is declining, and because of this, the burbot has been petitioned for listing as a federally endangered species. The decline in this population has been attributed to the operation of Libby Dam for hydroelectric power flood control. Similar declines in burbot populations have been seen in other states following dam construction.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Overharvest	Evaluate angler exploitation rates and determine sustainability of wild populations
Poorly understood life history traits and habitat requirements	Increased surveys to gain basic population characteristics (e.g., population sizes, age structure, and condition)
Reduced numbers in river systems due to impoundments	Work with managing authorities to encourage reservoir management to mimic a natural hydrograph

Management Plan

Jones-Wuellner, Melissa R. and Christopher S. Guy. 2004. Status of burbot in Montana. Prepared for Montana Fish, Wildlife & Parks. Montana Cooperative Fisheries Research Unit, Montana State University, Bozeman, MT.

Citations

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Sauger (*Sander canadensis*)

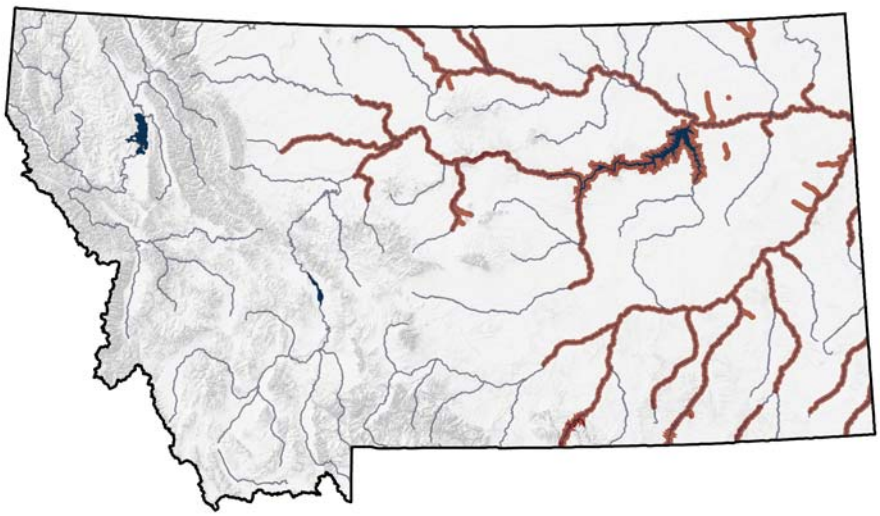

Figure 60. Distribution of the Sauger

Range

The sauger is one of the most widely distributed North American fishes, with a historical range extending across most of central and eastern North America from the St. Lawrence-Champlain system south, west of the Appalachian Mountains, to the Tennessee River in Alabama, and northwestward to central Montana and Alberta (Scott and Crossman 1973).

In Montana, historical distribution included the Missouri River and its major tributaries downstream of Great Falls and the Yellowstone River and its major tributaries downstream of the Clark Fork (McMahon and Gardner 2001). Current distribution in Montana has declined by 53 percent from historical levels with the largest losses occurring in tributaries (McMahon and Gardner 2001). Current distribution in the Missouri River drainage is confined to the primary stem of the Missouri and small parts of the previously widely occupied Marias, Musselshell, and Milk rivers (McMahon and Gardner 2001). Sauger are considered rare or absent in other major tributaries such as the Teton, Judith, and Poplar rivers (McMahon and Gardner 2001). In the primary stem of the Yellowstone River, distribution is now considered limited to downstream of Rosebud Creek; sauger are considered rare or absent in major tributaries such as the Big Horn and Tongue rivers, although a small, partially isolated population may persist in the upper Powder River (McMahon and Gardner 2001; B. Stewart, Wyoming Department of Game and Fish, Sheridan, WY, personal communication).

Habitat

Sauger typically occur in large turbid rivers and shallow turbid lakes (Becker 1983). Turbidity is an important delineator of suitable habitat for sauger. Physiological adaptations, such as a highly advanced light-gathering retina, allow sauger to thrive in low-light environments (Ali and Anctil 1977; Crance 1987). At cool water mesotherms, sauger have a fairly wide range of thermal tolerance with occupied temperatures ranging from 1 to 30 degrees C and a physiological optimum of 18 to 24 degrees C (Crance 1987; Carlander 1997).

Sauger are heavily dependent throughout their life histories on unimpeded access to the wide diversity of physical habitats that are present in large river systems. They are considered to be the most migratory percid (Collette 1977). Their migratory behavior, which is primarily related to spawning, is well documented throughout their range with annual movements of up to 600 kilometers between spawning and rearing habitats (Nelson 1968; Collette et al. 1977; Penkal 1992; Pegg et al. 1997; M. E. Jaeger, Montana State University, unpublished data). Sauger are highly selective for spawning sites and commonly travel long distances to aggregate in a relatively few discrete areas to spawn (Nelson 1968; Nelson 1969; Gardner and Stewart 1987; Penkal 1992). Although primary stem spawning does occur (Jeager 2004), it has been suggested that sauger populations are strongly reliant on access to large tributaries for spawning (Nelson 1968; Gardner and Stewart 1987; Penkal 1992; Hesse 1994; McMahon 1999). Spawning locations are associated with unique geomorphic features, such as bluff pools and bedrock reefs, and rocky substrates over which sauger broadcast their eggs (Nelson 1968; Gardner and Stewart 1987; Hesse 1994; Jeager 2004). During a 10- to 12-day period following emergence, it is thought that larval sauger drift long distances downstream—up to 300 kilometers—prior to gaining the ability to maneuver horizontally and begin feeding (Nelson 1968; Penkal 1992; McMahon 1999). Juveniles rear in side channels, backwaters, oxbows, and other off-channel habitats during spring and summer before shifting to primary channel habitats in autumn (Gardner and Berg 1980; Gardner and Stewart 1987; Hesse 1994). Adult sauger also use off-channel and channel-margin habitats during the spring and early summer periods of high flow and turbidity, and then move to deeper primary channel habitats in late summer and autumn as decreasing flows and turbidities cause suitable off-channel habitats to become unavailable (Hesse 1994; M. E. Jaeger 2004).

Management

Montana boasts some of the most pristine large-river habitat in the United States. To promote the conservation and recovery of sauger to acceptable levels, an interagency agreement is being completed at this time by Fish, Wildlife & Parks to sustain and advance suager populations.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Water withdrawals resulting in low river flows	Minimize the diversion of water from river channels and limit processes such as channelization and streambank armoring that result in loss of important off-channel habitats
Reservoir operation that alters the natural hydrograph	Flow releases from dams can be regulated throughout the year to maximize spawning success and year-class strength of sauger (Nelson 1968; Walburg 1972)
	Preservation of natural hydrographs, natural processes of channel formation, and high degrees of connectivity where sauger currently exist
Barriers that negatively influence spawning movement patterns and larval drift	Removal of primary stem and tributary impoundments
	Improved passage at several irrigation-related migratory barriers
Channelization and loss of side channel habitat for larval and juvenile sauger	Install fish screens and return structures to minimize entrapment of fish in irrigation canals
Hybridization with walleye	Continue surveying and monitoring of species
Negative interactions with other species such as walleye and smallmouth bass	Research to better understand interaction between sauger and exotic species
Overexploitation	Increase angler harvest limits in certain areas

Management Plan

Montana Department of Fish, Wildlife & Parks. 2004. Memorandum of Understanding and Conservation Agreement for Sauger (*Sander canadensis*) in Montana. 23 pp. Draft (in progress).

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Amphibians

Coeur d' Alene Salamander (*Plethodon idahoensis*)

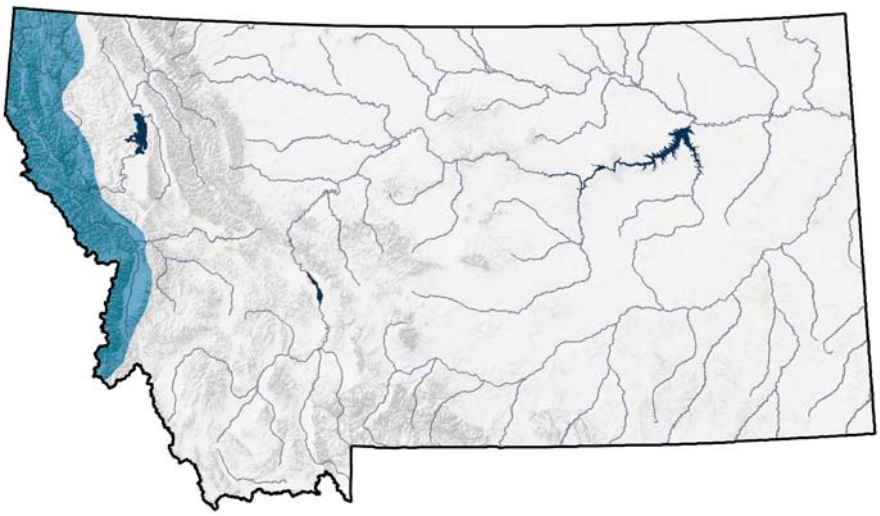

Figure 61. Distribution of the Coeur d' Alene Salamander

Range

The Coeur d' Alene salamander is a regional endemic for which Montana is the eastern limit in distribution. In Montana, the Coeur d' Alene salamander is known from about 45 locations in five northwestern counties: Lincoln, Sanders, Mineral, Missoula, and Ravalli. The southern limit of known distribution is Lake Como Falls in the Bitterroot River drainage (Maxell 2002), and the northernmost population is along the South Fork of the Yaak River (Wilson and Simon 1987; Maxell et al. 2003). Maximum known elevation is 5,200 feet (1,585 meters).

The Coeur d' Alene salamander has been the subject of taxonomic controversy nearly since its initial discovery. First classified as a new species (Slater and Slipp 1940), it was later reclassified (Lowe 1950) as a subspecies of the Van Dyke salamander (*Plethodon vandykei idahoensis*) found in western Washington. Whether considered a species or a subspecies, the Coeur d' Alene salamander represents a unique genetic resource in Idaho, Montana, and British Columbia and should be managed as such (Howard 1993). The Coeur d' Alene salamander has a small range in northern Idaho, western Montana, and southeastern British Columbia. It is found in close association with water in springs or seeps, spray zones of waterfalls, and edges of streams and feeds on aquatic and terrestrial insects. Coeur d' Alene salamanders tend to have small home ranges, are strongly philopatric, and show no tendency to disperse away from home ranges when disturbed (Petranka et al. 1993).

The Coeur d' Alene salamander is rare and local, distributed in suitable habitat (Werner and Reichel 1994), and in Montana is reported in Lincoln, Sanders, Mineral, Missoula, and Ravalli counties. The core of distribution and area of greatest density of known locations is in the northern Idaho drainages of the St. Joe, North Fork Clearwater, and Coeur d' Alene rivers in Idaho (Groves 1989), but the distribution of the species does extend northward along the Moyie River drainage into British Columbia, Canada (Wilson et al. 1989).

Habitat

The habitat for Coeur d' Alene salamanders includes the three major habitat categories: springs and seeps, waterfall spray zones, and stream edges (Wilson and Larsen 1988; Werner and Reichel 1994; Boundy 2001; Maxell 2002). Specific primary habitats are seeps and streamside talus, but they also inhabit talus far from free water (deep talus mixed with moist soil on well-shaded north-facing slopes). Coeur d' Alene salamander occurrences are generally located in coniferous forests, but are not restricted to a particular overstory species or aspect. In wet weather, they also occur in leaf litter and under bark and logs in coniferous forests.

All plethodontid salamanders respire through their skin; terrestrial species lose water to the environment through evaporation and are therefore restricted to cool, damp environments. Coeur d' Alene salamanders are closely tied to water and are considered among the most aquatic plethodontids (Brodie and Storm 1970). Because they may live in the harshest climate of any northwestern plethodontid (Nussbaum et al. 1983), they are highly dependent on the thermal and hydrologic stability provided by wet habitats in otherwise inhospitable surroundings.

Sites occupied by Coeur d' Alene salamanders in Montana have fractured rock formations present, and nearby habitats are typically forested (Reichel and Flath 1995). Foraging areas include seepage areas and splash zones with high humidity, high substrate moisture, and relatively high temperatures (Wilson and Larsen 1988). Shelter is provided by deep bedrock fractures or in talus habitat (Wilson and Larsen 1988). Montana populations are found primarily in talus areas along splash zones of creeks, or with seeps running through (Teberg 1963, 1965; Wilson and Larsen 1988). Idaho and Montana populations breed in both spring and fall, although most eggs usually are laid in the spring. Eggs are laid in moist, concealed places on land (Stebbins 1985) far down in the rocks (Werner and Reichel 1994).

Management

Potential threats for the species across its global range also apply to Montana populations, but population declines or extinctions have not yet been documented here. Some populations continue to be vulnerable to highway

construction activity, and most populations occur at elevations and in forest types where timber harvest is a common activity. Routine monitoring (Groves et al. 1996) of known populations should be conducted to identify threats to each, as well as to determine their continued viability.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Disturbances, such as timber harvest, fire, road and trail construction, and water diversion projects	Fence known salamander sites to exclude livestock
Pollution	Regulate chemical application (herbicides, pesticides, fertilizers, etc.) within 300 feet of water bodies or wetlands
Introduction of exotic species	Avoid road construction within 300 feet of known salamander sites and avoid stocking non-native fish in nearby waters
Restricted mobility coupled with increasing habitat fragmentation make the Coeur d' Alene salamander susceptible to local extirpation	Habitat protection and conservation through regulation of development, logging, and chemical applications
	Surveys of potential habitats for the Coeur d' Alene salamander
Disease and parasites	To prevent spread of chytrid fungus, personnel working in either lentic or lotic systems should thoroughly rinse and decontaminate all equipment as described in Maxell et al. (2004)
Global climate change	Conduct monitoring program to establish long-term trends of abundance and distribution of populations

Management Plan

Maxell, Bryce A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history, and the status and conservation of individual species. Contract No. 43-0343-0-0224. September 20, 2000.

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Western Toad (*Bufo boreas*)

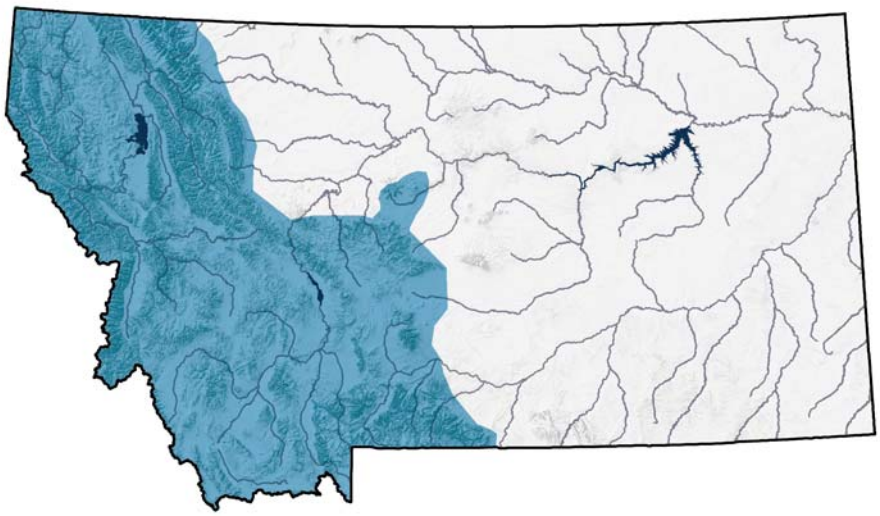

Figure 62. Distribution of the Western Toad

Range

The western toad is found throughout the mountains and intermountain valleys of the western third of the state on both sides of the Continental Divide (Maxell et al. 2003). Specimens have been collected in 22 western counties and sighted in 5 more, at elevations up to 9,220 feet (2,810 meters).

Habitat

Habitats used by western toads in Montana are similar to those reported for other regions and range from low-elevation beaver ponds, reservoirs, streams, marshes, lake shores, potholes, wet meadows, and marshes to high-elevation ponds, fens, and tarns at or near tree line (Rodgers and Jellison 1942; Brunson and Demaree 1951; Miller 1978; Marnell 1997; Werner et al. 1998; Boundy 2001). Forest cover in or near encounter sites is often unreported, but toads have been noted in open-canopy ponderosa pine woodlands and closed-canopy dry conifer forests in Sanders County (Boundy 2001), willow wetland thickets and aspen stands bordering Engelmann spruce stands in Beaverhead County (Jean et al. 2002), and mixed ponderosa pine/cottonwood/willow sites or Douglas-fir/ponderosa pine forests in Ravalli and Missoula counties (P. Hendricks, personal observation).

Elsewhere the western toad is known to utilize a wide variety of habitats, including desert springs and streams, meadows and woodlands, mountain wetlands, beaver ponds, marshes, ditches, and backwater channels of rivers where they prefer shallow areas with mud bottoms (Nussbaum et al. 1983; Baxter and Stone 1985; Russell and Bauer 1993; Koch and Peterson 1995;

Hammerson 1999). Forest cover around occupied montane wetlands may include aspen, Douglas-fir, lodgepole pine, Engelmann spruce, and subalpine fir; in local situations western toads may also be found in ponderosa pine forest. They also occur in urban settings, sometimes congregating under streetlights at night to feed on insects (Hammerson 1999; P. Hendricks, personal observation). Normally they remain fairly close to ponds, lakes, reservoirs, and slow-moving rivers and streams during the day, but may range widely at night. Eggs and larvae develop in still, shallow areas of ponds, lakes, or reservoirs or in pools of slow-moving streams, often where there is sparse emergent vegetation. Adult and juvenile western toads dig burrows in loose soil, use burrows of small mammals, or occupy shallow shelters under logs or rocks. At least some toads overwinter in terrestrial burrows or cavities, apparently where conditions prevent freezing (Nussbaum et al. 1983; Koch and Peterson 1995; Hammerson 1999).

Management

In previous decades the western toad was considered the most abundant amphibian of the western third of the state (Rodgers and Jellison 1942; Brunson 1952; Maxell 2003), and although still encountered widely and frequently though by no means commonly, it is no longer ranked as the most abundant amphibian. Numerous surveys since the early 1990s indicate that this species has experienced regional population declines in the state. Western toads were documented to breed at only 2 to 5 percent of more than 2,000 standing water bodies surveyed since 1997, and where breeding was documented, fewer than ten breeding females contributed in a given year (Maxell 2000; Maxell et al. 2003). Range-wide declines in this species have been indicated in Montana as well as in other western states.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Breeding site destruction	Reduce access by livestock to known breeding sites within grazing allotments, which will prevent undue trampling mortality (Bartelt 1998)
	Protect certain wetlands occupied by western toads from introduced species and human disturbance
	Survey road ditches for tadpoles before any blading of ditches in June/July
	Survey wetlands suitable for western toads

Diseases such as red-leg disease and chytrid fungus	To prevent spread of chytrid fungus, personnel working in either lentic or lotic systems should thoroughly rinse and decontaminate all equipment as described in Maxell et al. (2004)
Use of chemicals and fertilizers	Avoid use of pesticides, fertilizers, and herbicides near known breeding areas
Increased predation by species attracted to human disturbance	Avoid stocking of predatory game fish at sites lacking them

Management Plan

Maxell, Bryce A. 2000. Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history and the status and conservation of individual species. Contract No. 43-0343-0-0224. September 20, 2000.

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Northern Leopard Frog (*Rana pipiens*)

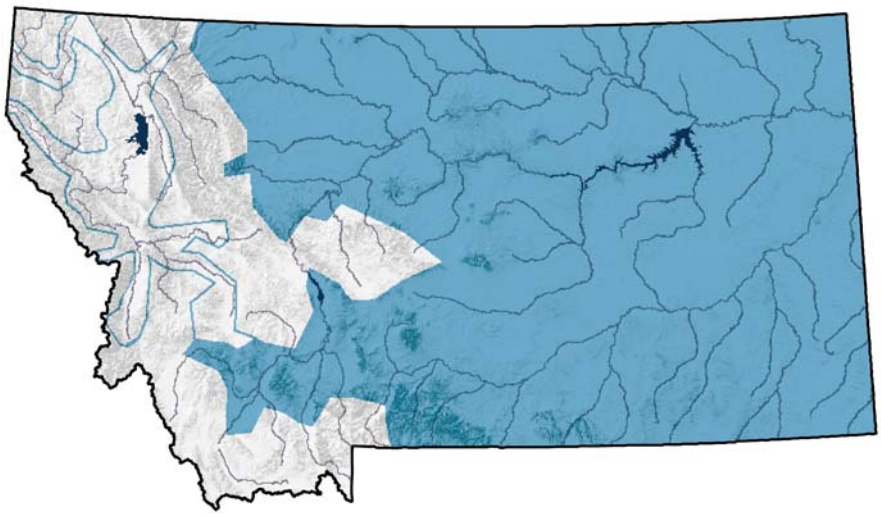

Figure 63. Distribution of the Northern Leopard Frog

Range

The northern leopard frog is found across the prairie regions of the eastern two-thirds of Montana east of the Continental Divide (Maxell et al. 2004; Werner et al. 2004). It was historically dispersed throughout intermountain valleys west of the Continental Divide, especially in the Flathead and lower Clark Fork river drainages, but in recent years has been documented as isolated populations in only two western sites (Werner 2003; Johnson 2005): near Kalispell (Flathead County) and Eureka (Lincoln County).This frog has been documented in all but seven Montana counties (six of which are west of the Continental Divide), at elevations up to 6,700 feet (2,042 meters).

The northern leopard frog's historical distribution is irregular but includes western Montana except in the Big Hole area, as well as the tip of the Idaho Panhandle and southeast and parts of southwest Idaho (Stebbins 1985). Recent extirpations are reported in all of western Montana and across much of the neighboring states (Werner and Reichel 1994; Reichel and Flath 1995).

Habitat

Habitats used by northern leopard frogs in Montana include low-elevation and valley bottom ponds, spillway ponds, beaver ponds, stock reservoirs, lakes, creeks, pools in intermittent streams, warmwater springs, potholes, and marshes (Brunson and Demaree 1951; Mosimann and Rabb 1952; Black 1969; Miller 1978; Dood 1980; Reichel 1995; Hendricks and Reichel 1996; Hendricks 1999). Northern leopard frogs require a mosaic of habitats to meet annual requirements of all life stages. They occupy a variety of wetland habitats of relatively fresh

water with moderate salinity, including springs, slow streams, marshes, bogs, ponds, canals, floodplains, beaver ponds, reservoirs, and lakes, usually in permanent water with rooted aquatic vegetation. Adults and juveniles commonly feed in open or semi-open wet meadows and fields with shorter vegetation, usually near the margins of water bodies where there is permanent water and growth of cattails or other aquatic vegetation, yet they may forage far from water in damp meadows (Stebbins 1985). They seek cover underwater and seem to avoid denser vegetation.

Northern leopard frogs have a large range throughout much of the United States and southern Canada (NatureServe 2004) and are still common in many areas and in a wide array of pristine and disturbed habitats (NatureServe 2004). NatureServe (2004) lists the northern leopard frog in 35 states in the United States and 12 Canadian provinces. In Montana the northern leopard frog is found primarily in riparian habitat but is not as restricted to water as other *Rana* species (Black 1969; Miller 1978). This species is abundant on plains near permanent water (Black 1969; Mosimann and Rabb 1952), tends to avoid tall, dense grass areas (Miller 1978), and prefers densely vegetated areas such as wet sedge meadows or cattail marshes (Reichel and Flath 1995; Werner and Reichel 1994).

Management

No special management needs are currently recognized for populations in eastern Montana; however, in western Montana, monitoring and reintroduction programs are occurring. Any populations discovered in the western region should be reported to the native species biologist of the Montana Department of Fish, Wildlife & Parks or the program zoologist of the Montana Natural Heritage Program.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Northern Leopard Frog range has nearly vanished on western side of Continental Divide in Montana	Protect the two remaining breeding populations west of the Continental Divide in Montana
	Survey western Montana to locate additional populations
	Monitor historical breeding sites and populations
Loss of wetlands and hydrological regimes	Habitat conservation and improvement projects
	Protect breeding sites from livestock impacts

Introduction of game fish, mosquitofish, and bullfrogs	Allow no introduction of game fish or bullfrogs into waters with known breeding sites
Contamination by pesticides and herbicides	Protect breeding sites from organic and chemical (pesticide and herbicide) contamination
Pathogens, including chytrid fugus (Batrachochytrium dendrobatidis)	To prevent spread of chytrid fungus, personnel working in either lentic or lotic systems should thoroughly rinse and decontaminate all equipment as described in Maxell et al. 2004 (unpublished)
Global change (climatic and atmospheric changes such as increased UV-B radiation, pollution, acid rain, and disease)	Conduct monitoring program to establish long-term trends of abundance and distribution of populations
Unsustainable use and illegal collecting	Increase education and information on amphibian biology and awareness of the importance of breeding sites

Management Plan

Maxell, Bryce A., 2000, Management of Montana's amphibians: a review of factors that may present a risk to population viability and accounts on the identification, distribution, taxonomy, habitat use, natural history and the status and conservation of individual species. Contract No. 43-0343-0-0224. September 20, 2000.

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Reptiles

Snapping Turtle (*Chelydra serpentina*)

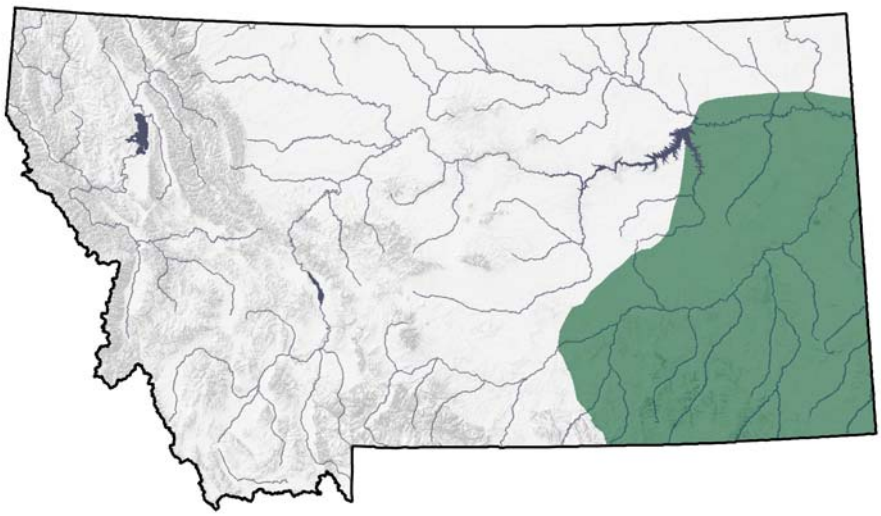

Figure 64. Distribution of the Snapping Turtle

Range

Voucher specimens of snapping turtles have been collected in three eastern counties (Carter, Powder River, and Rosebud), with visual observations in seven additional counties (Big Horn, Custer, Dawson, Wibaux, Richland, Roosevelt, and Yellowstone), at elevations up to 3,800 feet (1,158 meters). Although there are no records of breeding populations on the Missouri River, several reliable sightings, including one on the Redwater River, may indicate existing populations (Werner et al. 2004). Snapping turtles have probably been introduced in several localities (there are unconfirmed reports from Gallatin, Ravalli, and Sanders counties); confirmed records from Flathead and Lake counties represent introductions.

Habitat

Habitat use by snapping turtles in Montana is probably similar to elsewhere in the range, but studies are lacking and there is little qualitative information available. They have been captured or observed in backwaters along major rivers, at smaller reservoirs, and in smaller streams and creeks with permanent flowing water and sandy or muddy bottoms (Reichel 1995; Hendricks and Reichel 1996; P. Hendricks, personal observation). Nesting habitat and nest sites have not been described.

Elsewhere, snapping turtles occur in all types of shallow freshwater habitats, such as streams, rivers, reservoirs, and ponds, especially those with a soft mud

bottom and abundant aquatic vegetation or submerged brush and logs (Hammerson 1999), and in brackish water in some areas. Although found most often in shallower water, they have been reported on the bottom of lakes in water up to 10 meters deep. Temporary ponds also may be occupied. Hatchlings and juveniles tend to occupy shallower sites than mature individuals in the same water bodies. Snapping turtles are mostly bottom dwellers, which is where they spend much of their time. Although highly aquatic, they may make long movements overland if their pond or marsh dries (Baxter and Stone 1985; Ernest et al. 1994; Hammerson 1999). They hibernate singly or in groups in streams, lakes, ponds, or marshes; in bottom mud, in or under submerged logs or debris, under an overhanging bank, or in muskrat tunnels; often in shallow water; sometimes in anoxic sites (Brown and Brooks 1994). Sometimes snapping turtles bask out of water, especially younger individuals and in the northern extremes of the global range.

Nests are built in soft sand, loam, vegetation debris, or even sawdust piles, most often in open areas and often 100 meters or more from water (Congdon et al. 1987; Ernst et al. 1994; Hammerson 1999). They also nest in beaver and muskrat lodges.

Management

Montana populations of the snapping turtle are poorly understood, making management more difficult. It is possible that even moderate harvest of adults by anglers in most localities will result in population declines, similar to Colorado (Hammerson 1999), because the life history of this species indicates recruitment of juveniles into breeding populations is low, and population densities in western states is probably low.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Biological information lacking in Montana	Consider preparing a management plan for the snapping turtle or include it into other comprehensive taxonomic plans
	Meticulous tracking of observations and biological information
	Conduct surveys of suitable habitat that are designed to detect the species
Habitat loss and degradation, including barriers that hamper movement of snapping turtles	Conservation of major river systems in Montana
Nest destruction and predation	Conservation of nest areas
Human harvest of long-lived adults	Review harvests limits

Management Plan

None

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Spiny Softshell (*Apalone spinifera*)

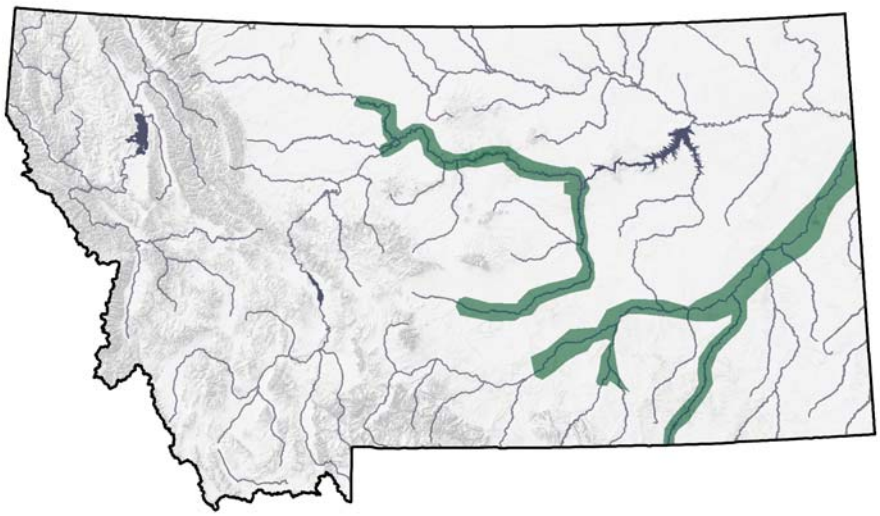

Figure 65. Distribution of the Spiny Softshell Turtle

Range

In Montana, native populations of the spiny softshell are present east of the Continental Divide in the Missouri River and Yellowstone River drainages, and some principle tributaries (Maxell et al. 2003). Large gaps remain in the species' range within Montana, especially in the Missouri River below the mouth of the Musselshell River. Spiny softshells in Montana are thought to be isolated from the remainder of the global population, and it appears the population in the Missouri River is isolated from the population in the Yellowstone River. Voucher specimens have been collected in five counties (Big Horn, Chouteau, Prairie, Rosebud, and Wheatland), with visual observations in eight additional counties, at elevations up to 3,600 feet (1,097 meters); a questionable voucher record exists from Roosevelt County.

Habitat

Habitat use by spiny softshells in Montana is probably similar to elsewhere in the range, but studies are lacking and there is little qualitative information available. They occupy larger rivers and tributaries. Both sexes have been observed basking together on partially submerged logs in backwater sites of slow-moving water and on sandy or muddy riverbanks (P. Hendricks, personal observation).

Generally, the spiny softshell is primarily a riverine species, occupying large rivers and river impoundments, but also occurs in lakes, ponds along rivers, pools along intermittent streams, bayous, irrigation canals, and oxbows. Spiny softshells usually are found in areas with open sandy or muddy banks, a soft bottom, and submerged brush and other debris. They bask on shores or on

partially submerged logs and burrow into the bottoms of permanent water bodies, either shallow or relatively deep (0.5 to 7 meters), where they spend the winter. Eggs are laid in nests dug in open areas in sand, gravel, or soft soil near water (Baxter and Stone 1985; Ernst et al. 1994; Hammerson 1999; Stebbins 2003).

Management

Montana populations of the spiny softshell are poorly understood, making management more difficult. No management plan is in place at this time.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Little biological information for Montana populations	Consider preparing a management plan for the spiny softshell or include it into other comprehensive taxonomic plans
Habitat loss and degradation, including barriers that hamper movement of spiny softshells	Conservation of major rivers in Montana
Nest disturbance	Protect nest sites from human disturbance
Incidental take from anglers	Thorough documentation of observations and incidental take

Management Plan

None

Citations

Baxter, G. T., and M. D. Stone. 1985. Amphibians and reptiles of Wyoming. 2nd ed. Wyoming Game and Fish Department, Cheyenne, WY.

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Werner, J. K., B. A. Maxell, D. Flath, and D. P. Hendricks. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 pp.

Western Hog-nosed Snake (*Heterodon nasicus*)

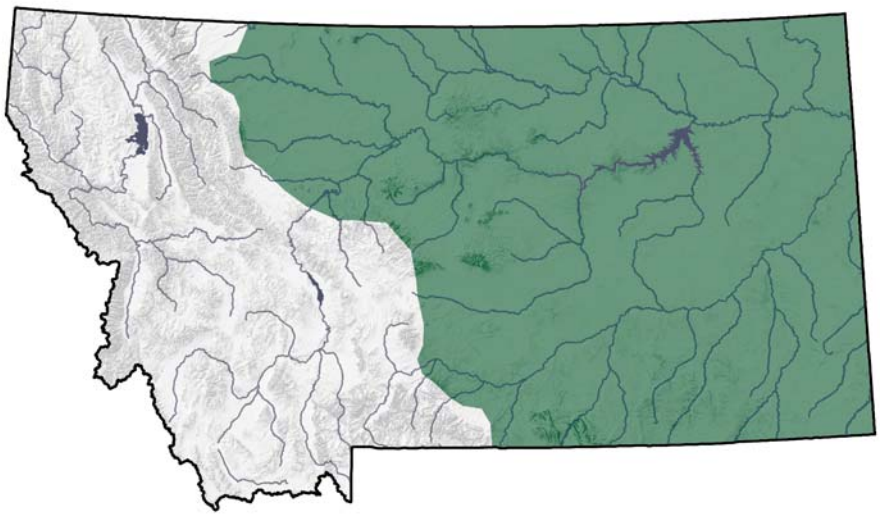

Figure 66. Distribution of the Western Hog-nosed Snake

Range

In Montana, the western hog-nosed snake is found east of the Continental Divide throughout the prairies, although significant gaps in its known distribution remain in the central region between the “island” mountain ranges, and there have been few reports statewide in the last ten years (Maxell et al. 2003). Voucher specimens exist for 17 eastern counties, and there are observation records from 7 additional counties, at elevations up to 4,060 feet (1,237 meters).

Habitat

Little specific information for the state is available. Western hog-nosed snakes have been reported in areas of sagebrush grassland habitat (Dood 1980) and near pine savannah in grassland underlain by sandy soil (Reichel 1995; Hendricks 1999). Distribution of soil and vegetation and proximity to water could be limiting factors for distribution.

In other locations, their apparent preference for arid areas, farmlands, and floodplains, particularly those with gravelly or sandy soil, has been noted. They occupy burrows or dig into soil and can be found under rocks or debris during periods of inactivity (Baxter and Stone 1985; Hammerson 1999; Stebbins 2003).

Management

Apparently the western hog-nosed snake was relatively abundant in Montana during the late 19th century. In 1876 it was the third most common reptile (after the western rattlesnake and short-horned lizard) along the Missouri River

between Fort Benton and the mouth of the Judith River (Cope 1879). This is no longer the case (Maxell et al. 2003); the few recent records suggest that the species is uncommon throughout Montana, although its status is largely unknown.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Distribution, status, and habitat uses are poorly understood	Develop a comprehensive taxanomic management plan (e.g., for reptiles) that includes the western hog-nosed snake and addresses the concerns listed
	Record all observations of this species to continue establishing its range in Montana
Some evidence for declines are potentially associated with habitat loss	Conservation of prairie land and prey habitat (wetlands)
Pet trade industry	Increase education and information on reptile biology and awareness of the importance of den and nest sites
Declines in prey (amphibians)	Targeted surveys (specific to both hog-nosed snakes and prey base) in suitable habitat to continue determining their abundance and range in Montana
Dependent on natural flood regimes that provide gravel and sandy beaches in which they and their amphibian prey can burrow	Mainenance of natural flood regime

Management Plan

None

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Werner, J. K., B. A. Maxell, D. Flath, and D. P. Hendricks. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 pp.

Milksnake (*Lampropeltis triangulum)*

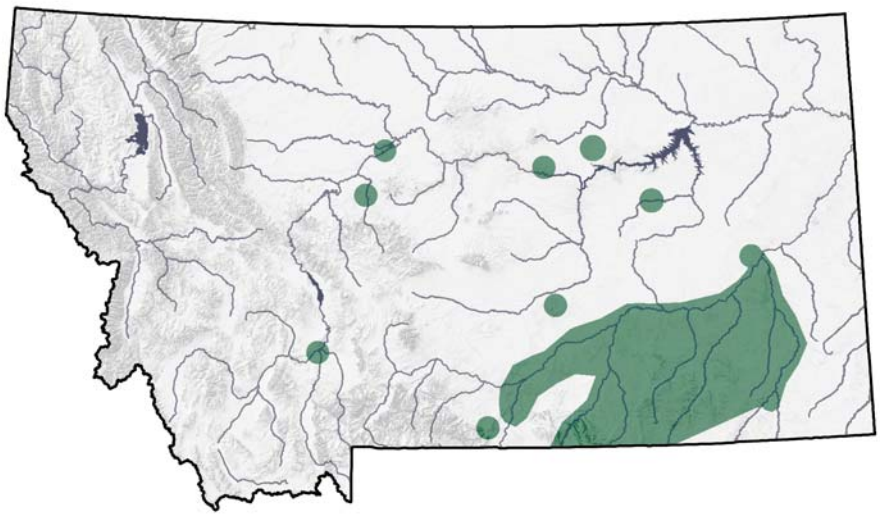

Figure 67. Distribution of the Milksnake

Range

In Montana, the milksnake is found east of the Continental Divide throughout much of the prairie regions, although mostly south of the Missouri River (Maxell et al. 2003); significant gaps are present in its known distribution, probably due in part to a combination of restricted habitat preferences, extensive use of cover (e.g., rocks), and nocturnal habits. Voucher specimens exist for seven counties (Carbon, Chouteau, Custer, Garfield, Phillips, Powder River, and Yellowstone), and there are observation records for four additional counties (Big Horn, Musselshell, Prairie, and Rosebud), at elevations up to 3,960 feet (1,207 meters). Questionable records exist for Cascade County near Belt and the boundary of Broadwater, Gallatin, and Jefferson counties near Three Forks.

Habitat

Little specific information is available. Milksnakes have been reported in areas of open sagebrush grassland habitat (Dood 1980) and ponderosa pine savannah with sandy soils (Hendricks 1999; B. Maxell, personal communication; L. Vitt, personal communication), most often in or near areas of rocky outcrops and hillsides or badland scarps, sometimes within city limits.

Management

So few recent milksnake records exist for Montana (Maxell et al. 2003) that it is difficult to determine if management activity is needed. Nevertheless, the widely scattered recent records indicate that milksnakes continue to occupy a large part of the known range in the state, and some sites near a large urban center have

remained occupied for the last 40 to 45 years (L. Vitt, personal communication). Management for this species is hampered by a lack of basic information on abundance, food habits, and habitat associations.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Distribution, status, and biology are poorly understood	Develop a comprehensive taxanomic management plan (e.g., for reptiles) that includes the milksnake and addresses the conservation concerns listed
	Record all observations of this species to continue establishing its range in Montana
	Targeted surveys (specific to the milksnake) in suitable habitat to continue determining its range in Montana
Pet trade industry	Increase education and information on reptile biology and awareness of the importance of den and nest sites

Management Plan

None

Citations

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Hendricks, P. 1999. Amphibian and reptile survey of the Bureau of Land Management, Miles City District, Montana. Montana Natural Heritage Program, Helena, MT. 80 pp.

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Werner, J. K., B. A. Maxell, D. Flath, and D. P. Hendricks. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 pp.

Smooth Greensnake (*Opheodrys vernalis*)

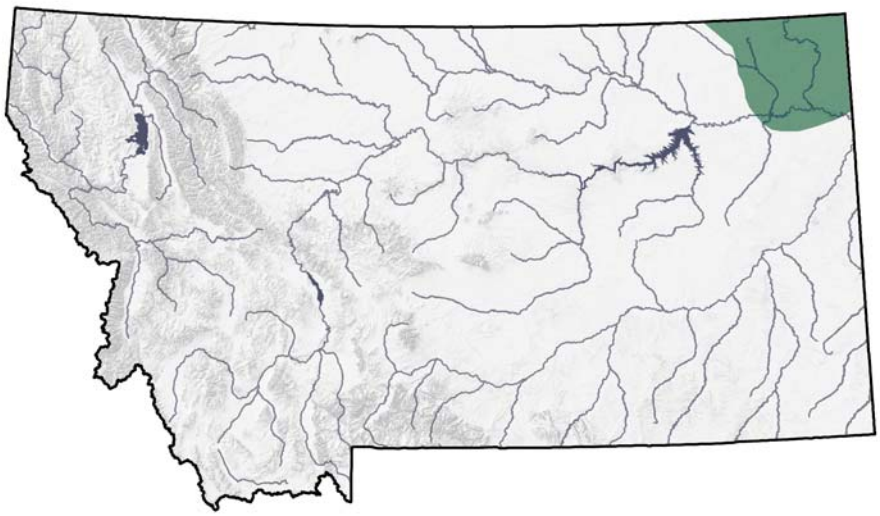

Figure 68. Distribution of the Smooth Greensnake

Range

Montana is at the edge of the smooth greensnake's global range. The species is restricted to extreme northeastern Montana north of the Missouri River, at elevations below 2,780 feet (847 meters). There are reliable records from Sheridan County (Maxell et al. 2003); smooth greensnakes recently have been found in Valley County, and they undoubtedly occur in Roosevelt County. This snake may eventually be documented south of the Missouri River near the boundry with North Dakota.

Habitat

Little information is available for the species in Montana, though it has been reported on residential lawns, in city parks, along ditches in the prairie pothole region, and around wetland complexes. Based upon observations outside Montana, the smooth greensnake is known to occupy meadows, grassy marshes, moist grassy fields at forest edges, mountain shrublands, stream borders, bogs, open moist woodlands, abandoned farmlands, and vacant lots. Periods of inactivity are spent underground, beneath woody debris and rocks or in rotting wood. Smooth greensnakes have been found hibernating in abandoned ant mounds. Most activity is restricted to the ground, but they may climb into low vegetation and sometimes enter water (Hammerson 1999).

Management

No special management activity is defined at this time.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Distribution, status, and biology in Montana are poorly understood	Develop a comprehensive taxanomic management plan (e.g., for reptiles) that includes the smooth greensnake and addresses the conservation concerns listed above
	Targeted surveys (specific to the smooth greensnake) in suitable habitat to continue determining its range in Montana
	Record all observations of this species to continue establishing its range in Montana
	Habitat where smooth greensnakes occur should be conserved
	Increase education and information on reptile biology

Management Plan

None

Citations

Hammerson, G. A. 1999. Amphibians and reptiles in Colorado. 2nd ed. University Press of Colorado, Boulder, CO. 484 pp + xxvi.

Maxell, B., K. J. Werner, P. Hendricks, and D. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Olympia, WA: Society for Northwestern Vertebrate Biology. Northwest Fauna 5:1–138.

Werner, J. K., B. A. Maxell, D. Flath, and D. P. Hendricks. 2004. Amphibians and reptiles of Montana. Missoula, MT: Mountain Press Publishing Company. 262 pp.

Birds

Common Loon (*Gavia immer*)

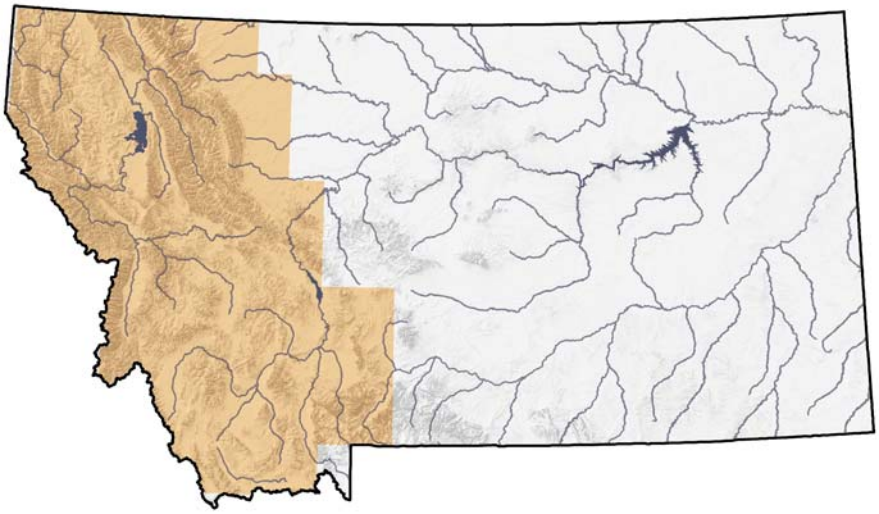

Figure 69. Distribution of the Common Loon
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The global population of the common loon is considered “secure” (IUCN G5 Ranking); however, many local populations are small and isolated, and are vulnerable to extinction primarily due to habitat loss and human encroachment into key habitat (Kelly 1992; Evers 2004). Loons are considered imperiled (MT ranking S2) by the Montana Natural Heritage Program and are already listed as a “sensitive species” by the U.S. Forest Service (R-1) and a Species of Management Concern by the USFWS Region 6 (U.S. Fish and Wildlife Service 1995).

In Montana, the current breeding range for common loons is primarily restricted to lower elevation forested glacial lakes in the northwest corner of the state. Historically, common loons were believed to have nested throughout the western half of the state where suitable habitat was found. The primary nesting habitat currently used is restricted to lakes in the Blackfoot, Flathead, and Kootenai river drainages, with some breeding occurring on the east side of Glacier National Park and on the Blackfeet Indian Reservation. Loons also currently nest in Yellowstone National Park; historical records include lakes in southwest Montana. Common loons breeding in Canada migrate through the entire state during spring and fall. Rafts of more than 60 birds frequently have been observed on major lakes and reservoirs throughout the state. Nonbreeding common loons are occasionally observed during the summer in Montana, also on larger lakes or reservoirs. A pair of common loons once nested in central Montana at Nelson

Reservoir near Malta (F. Prellwitz, personal communication in Dolan 1994). Common loons have been recorded as breeding in 11 Montana counties: Lincoln, Flathead, Glacier, Sanders, Lake, Missoula, Powell, Lewis and Clark, Teton, Beaverhead, and Madison (Montana Bird Distribution 2003, MNHP 2002) (Montana Animal Field Guide 2004). The northwestern portion of Montana supports the highest density of nesting common loons in the lower 48 states west of the Mississippi River. Based on coordinated total counts of common loons in mid-July over the last six years, Montana supports an average of 62 (+/- 5) breeding pairs that successfully raise an average of 43 (+/- 8) chicks each year. In addition, surveyors counted an average of 48 single or nonbreeding adult loons. Total midsummer loon counts since 1999 have averaged 217 (range 201–230). Based on these data, the population appears to be stable (Bissell 2005).

Based on recoveries or reobservations of adult and juvenile banded common loons first captured on nesting lakes in northwestern Montana, these loons appear to winter along the west coast from Washington to the mid-California coast (Bissell 2005). Occasional overwintering also occurs in Montana. Common loons have been observed overwintering (December 15 through February 15) in Lincoln, Flathead, and Lake counties (Montana Bird Distribution 2003).

Habitat

In Montana, common loons will generally not nest on lakes less than about 13 acres in size or over 5,000 feet in elevation (Skaar 1990). If nesting on a small lake, they may use an adjacent lake for supplementary foraging (Montana Animal Field Guide 2004). Successful nesting requires both nesting sites and nursery areas sheltered from winds and disturbances. Small islands, coves, and bays are preferred general areas for nesting. Loons must nest adjacent to water, and they frequently nest on herbaceous shoreline areas but also logs, stumps, muskrat houses, floating vegetative mats, and gravel shorelines if that is all that is available. Nests usually consist of aquatic vegetation shaped into a shallow bowl located within a few inches of the water’s edge. Nursery areas are very often sheltered, shallow coves with abundant small fish and insects (Skaar 1990). Most Montana lakes inhabited by common loons are relatively oligotrophic and have not experienced significant siltation or other hydrological changes.

The quantity and quality of nesting habitat may limit the loon population of northwestern Montana. Skaar (1990) estimated the state’s “carrying capacity” at 185 potential nesting territories, based on the size and number of lakes within the species’ breeding distribution. He assumed 100 hectares of surface area per pair. Kelly (1992) documented a density of 72.2 hectares of surface water per adult loon for the Tobacco, Stillwater, Clearwater, and Swan river drainages.

Loons are a long-lived, slowly reproducing species that raise a maximum of only one to two young per year. It takes three years for loons to acquire adult plumage and an average of seven years before adults successfully occupy a territory and

raise young (Evers 2004). Adults may live to 20 years or more. Juvenile birds spend three winters in coastal waters before returning inland in adult plumage. Scientists studying common loons in other parts of their range estimate juvenile recruitment rates to the adult state (three years) to be about 40 percent (Evers 2004). Loons are also poor colonizers, with the young returning to within 5 to 20 kilometers of their natal area.This slow reproductive rate combined with limited dispersal distance and extreme territoriality presents some unique challenges to wildlife managers. Common loon habitat is relatively restricted in nature. Given their fierce territorial behavior to maintain successful occupation of a lake or portion of a lake, the occupation of all available habitats will inevitably lead to greater territorial conflicts. Repeated nest failures at Upper Thompson Lake in both 2004 and 2005 appear to be related to fighting, territorial switching, and general competition between two adjoining nesting pairs of loons and other territorial pairs in the drainage.

Management

Since 1999, management of common loons and their habitat in Montana is coordinated through the Common Loon Working Group (CLWG), an ad hoc advisory group consisting of representatives from state and federal agencies, tribes, nonprofit organizations such as the Montana Loon Society, and industry. This group coordinates surveys, research, and management programs and meets at least twice a year. The CLWG has helped solicit and fund the Loon Ranger Program as well as the recently started Loon Ecology Project using a State Wildlife Grant.

The current management program entails many activities focused on loon conservation including two coordinated annual population surveys: one in mid-May on accessible breeding lakes to determine territorial pair presence and possibly nesting, and a second survey in mid-July to count both adults and chicks of the year. The data are collected by the CLWG and housed in a centralized database maintained by the Montana Natural Heritage Program.

The management program also consists of implementing an annual outreach and education program using “Loon Rangers” at most breeding lakes that have high levels of recreational use. Through FWP’s summer internship program, three to four college students are hired each year to help with educational signs, floating buoys, surveys, and education programs at the busiest nesting lakes. The Loon Ranger Program was initiated in 2000. Funding is provided both by agencies and private donations. For many lakes, management includes the setting out of floating buoys around nest sites where conflicts with boaters has occurred, and the use of artificial loon platforms or nesting islands on lakes where nesting habitat has been reduced or lakes levels affected. Until recently, Glacier National Park participated only in annual surveys. This year, Glacier is initiating a citizen science program to more closely monitor nesting loons within the park. FWP has summarized the various CLWG activities over the last five years through periodic

annual reports available through the Wildlife Division or Region One headquarters. Preliminary evaluation of the education program indicates nesting success has been maintained or increased in the areas served by the program.

Other management options that have been occasionally implemented by lakeshore landowners such as FWP, DNRC, and the U.S. Forest Service include managing access to lakes through seasonal closures of trails or campsites, rerouting of roads or trails, strategic placement of educational signs, changing the design or upgrades of boat ramps, implementing no-wake rules, and providing input on proposed development projects. The members of the CLWG also work with homeowner associations to identify areas in need of conservation.

The new research efforts are focused on determining habitat factors associated with nesting success at various habitat scales; monitoring levels of methyl mercury and other contaminants in loon eggs and blood; estimating Montana's potential habitat capacity and the relationship between Montana's breeding population and adjoining populations to the west (Washington), north (Canada), or south (Wyoming); determining adult and juvenile survival and recruitment rates; and estimating overall population trends. The results will be used to update Montana's Common Loon Conservation Plan in 2008.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Disturbances to loon nesting and foraging lakes and shorelines caused by human activities such as boating, angling, camping, or other activities during the nesting season	Need to implement a territorial ranking system to help identify priority nesting lakes or areas
Loss of nesting habitat including alternative nesting areas and nursery areas due to development, water level alterations, and recreation	Need to estimate total amount of available habitat and percent occupancy of that habitat based on historical and current habitat conditions
	Need to maintain the suitability of currently used nesting territories and create site-specific management plans that use a variety of tools to maintain loon nesting sites and nursery areas
Loss of connectivity within Montana's populations as well as between Montana's population and other western populations	Need for population demographic and trend information for Montana as well as increased knowledge of migratory routes and other factors affecting overwinter survival

	Need to identify areas of population sinks and sources
	Need to identify risks and potential threats outside Montana to Montana's breeding population and the consequences of those risks
Accumulation of contaminants over the life of individual birds, including lead (from fish sinkers) poisoning and methyl mercury (Evers 2004)	Need to continue to investigate known causes of mortality including the effect of human sources including methyl mercury and lead on breeding loons
Research opportunities	Need to keep current database up to date and available for interagency use
	Complete ongoing research efforts to revise loon conservation plan
	Provide for continued cooperative funding for education and other aspects of ongoing loon management plan

Management Plans

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Trumpeter Swan (*Cygnus buccinator*)

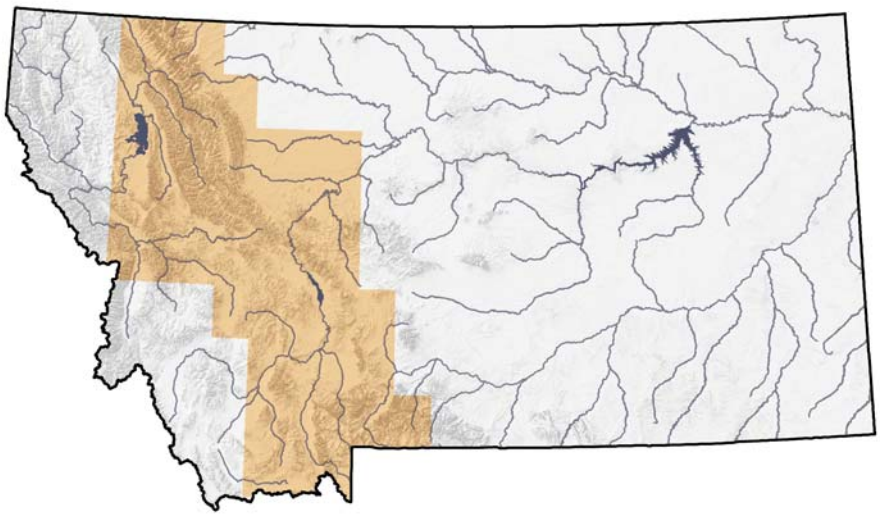

Figure 70. Distribution of the Trumpeter Swan
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Trumpeter swans breeding in Montana are all part of the Rocky Mountain population, which occurs all along the Rocky Mountain range. The breeding range of these trumpeter swans in Montana is restricted to the extreme southwestern corner of the state (Beaverhead County) and along the Rocky Mountain Front (Lewis and Clark County) (Montana Natural Heritage Program 2003). In Beaverhead County, trumpeter swans breed in the Red Rock Lakes National Wildlife Refuge in the Centennial Valley, specifically the Lima Reservoir and the Upper and Lower Red Rock Lakes. In Lewis and Clark County they inhabit several small pothole lakes along the front range of the Rocky Mountains, most of which are west and southwest of Augusta. This is a very small subpopulation of the larger population breeding in the Centennial Valley (MNHP 2003). Reintroductions are currently ongoing on the Flathead Indian Reservation in northwestern Montana as well.

The nonbreeding range of trumpeter swans is also limited to several areas in the southwestern part of the state (Beaverhead, Gallatin, and Madison counties). Virtually all of the birds breeding in southwestern Montana also winter there. Birds summering in Canada migrate to the area in winter to join them. In Beaverhead County, the Red Rock Lakes area in the Centennial Valley is a major wintering ground for the species. In Madison County, trumpeter swans winter at Ennis Lake and the Madison River up to approximately 15 miles upstream. In Gallatin County, they winter on the south fork arms of Hebgen

Reservoir, as well as the river below Hebgen Dam and several other smaller lakes in the area (MNHP 2003).

Trumpeter swans breeding in Montana are nonmigrants. They spend both the breeding season and the winter in southern Montana's lakes, ponds, and streams of the Red Rock Lakes National Wildlife Refuge. The Canadian subpopulation breeding in parts of British Columbia, Alberta, the Yukon, and the Northwest Territories move south in late October to early November (Mitchell 1994).

Fall migration dates for the Bozeman area are from November 15 to December 15 and spring from February 25 to April 15 (Skaar 1969). They usually follow the Rocky Mountain Front, moving fsrther south as water freezes or food diminishes. They eventually arrive in southern Montana and winter along with the resident population. Canadian swans leave their wintering grounds in early March to early April, moving up the Rocky Mountain Front toward their breeding habitat farther north (Mitchell 1994).

Habitat

The breeding habitat for trumpeter swans in the Red Rock Lakes/Centennial Valley of Montana includes lakes and ponds and adjacent marshes containing sufficient vegetation and nesting locations. Along the Rocky Mountain Front the breeding habitat is small pothole lakes, generally with sufficient water to maintain emergent vegetation through the breeding season (MNHP 2003). However, due to recent drought conditions, this small breeding population has been severely impacted. In 2003 there was an attempt by swans to nest in the Upper Blackfoot drainage, and this area is targeted for future population augmentation or reintroduction of trumpeter swans. Habitat requirements for breeding include room to take off (about 100 meters), shallow, unpolluted water with sufficient emergent vegetation and invertebrates, appropriate nest sites (e.g., muskrat lodges), and areas with little human disturbance (Mitchell 1994).

Nonbreeding habitat for trumpter swans in Montana consists of many large and small lakes and ponds in extreme southern Montana, including the breeding area of the Red Rock Lakes/Centennial Valley. Swans also winter in the Ennis Lake and Madison River complex, as well as Hebgen Lake and the surrounding area. During winter appropriate habitat is areas where water does not freeze and food is plentiful and accessible. Swans will move out of one lake or pond to another if conditions become too severe.

Management

Management for trumpeter swans began in Montana in the early 1930s with the designation of the Red Rock Lakes National Wildlife Refuge (NWR). This refuge was specifically created for continued trumpeter swan presence and for active

management practices. These early management practices consisted of protection from shooting, winter-feeding stations, and relocation to other breeding locations (Mitchell 1994). Some of these management activities are still in practice today, along with others including habitat restoration, human recreation management, breeding, wintering habitat management, and winter translocation work (Mitchell 1994). Since 1988 trumpeter swans have been relocated from the Red Rock Lakes NWR in southern Montana to locations in Idaho, Oregon, Wyoming, and Utah to promote exploration of new wintering habitats and to remedy the increasing problem of overpopulation in the refuge during winter. The goal is to have less than 10 percent winter at any one site and no swans wintering at the Red Rock Lakes NWR (Baskin 1993). In 1993 winter feeding stations were terminated in the Red Rock Lakes NWR. It was believed these stations were reducing the winter range expansion work, as birds would not actively explore new wintering locations if food were made readily available in the refuge. Since then, trumpeter swans have indeed dispersed to new areas in the west, and the remaining population in the Red Rock Lakes NWR has stabilized. Other management techniques are described and supported by the North American Management Plan for Trumpeter Swans (1984). As noted in the distribution comments, the Confederated Salish and Kootenai Tribes in northwestern Montana are also reintroducing trumpeter swans on the Flathead Indian Reservation. Recently, a cooperative effort has developed between USFWS and FWP to reintroduce breeding trumpeter swans to the Blackfoot River. Trumpeter swans are a Species of Management Concern in Region 6 (U.S. Fish and Wildlife Service 1995).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Isolation of breeding populations	Protect known nesting habitat and manage nesting habitat in a manner compatible with increasing swan production and connectivity between populations
Wetland degradation and destruction	Wetland restoration programs
Lack of information of breeding success	Continue surveys and monitoring of populations
Vulnerable to power line collisions	Relocate power lines underground in areas adjacent to nesting and brood rearing locations

Management Plans

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Harlequin Duck (*Histrionicus histrionicus*)

Figure 71. Distribution of the Harlequin Duck
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The harlequin duck's range is small and fragmented and is found primarily in northwestern Montana and parts of the Greater Yellowstone ecotype.

Harlequin ducks breed in Alaska and western Canada, south to eastern Oregon and east-central California, Idaho, and Wyoming; they also breed in eastern Canada. They winter in the Aleutian and Pribilof Islands, south to central California and also in the Maritime Provinces south to Maryland (Karl 2000). In North America harlequin ducks winter along the north Pacific coast, then migrate inland to nest along swiftly flowing mountain streams (Bellrose 1980). Although still globally widespread, the Atlantic population may be reaching critically low levels, and the Pacific population has experienced substantial declines (NatureServe 2004).

Habitat

In Montana, most harlequin ducks inhabit fast-moving, low-gradient, clear mountain streams. Overstory in Montana does not appear to affect habitat use: In Glacier National Park, birds used primarily old-growth or mature forest (90 percent), and most birds in streams on the Rocky Mountain Front were seen in pole-sized timber (Diamond and Finnegan 1993). Banks are most often covered with a mosaic of trees and shrubs, but the only significant positive correlation is with overhanging vegetation (Diamond and Finnegan 1993; Ashley 1994).

Four habitat characteristics were noted at more than 50 percent of harlequin duck observations in the Tetons (Wallen 1987): 1) streamside perennial shrub vegetation, 2) meandering (braided) channel types, 3) more than three loafing sites per 10 meters, and 4) areas unused by humans. Wallen (1987) postulated that human activities might have a greater influence on breeding success than available habitat. Harlequins feed primarily on crustaceans, mollusks, insects, and a few small fishes (Karl 2000).

The strongest stream section factor in Montana appears to be for stream reaches with 2-plus loafing sites per 10 meters (Kuchel 1977; Diamond and Finnegan 1993; Ashley 1994). Broods may preferentially use backwater areas, especially shortly after hatching (Kuchel 1977), though this is not apparent in data from other studies (Ashley 1994). Stream width ranges from 3 to 35 meters in Montana. On stream gradients of 7 percent, occupied stream reaches ranged from 1.8 to 2.8 percent (Fairman and Miller 1990), while velocity at 42 harlequin observation points ranged from 0.8 to 4.1 meters per second (Diamond and Finnegan 1993). Harlequins in Glacier National Park used straight, curved, meandering, and braided stream reaches in proportion to their availability, as was the case for bottom types (Ashley 1994).

Harlequin ducks breed locally on mountain streams in the western part of the state (Reichel and Genter 1995), including the Kootenai, Flathead, Clark Fork, and Blackfoot river drainages. Scattered breeding also occurs along the Rocky Mountain Front and the northern edge of Yellowstone National Park (Montana Partners in Flight 2004). Harlequin ducks are known to occur in Bonner, Boundary, Clearwater, and Shoshone counties in Idaho. Harlequin ducks in Glacier National Park confine almost all activities to swiftly running waters (90 percent of area used), but also used cut-off side channels and other backwaters during periods of high water and as brood rearing habitat (Kuckel 1977). Females with broods avoided all areas frequented by humans. Occupied streams in northern Idaho were usually in mature/old-growth western red cedar/western hemlock or Engelmann spruce/subalpine fir stands. Cassirer and Groves (1991) suggested that the presence of mature/old-growth forest in northern Idaho might indicate streams with high-quality, low-sediment loads, intact riparian areas, and relative inaccessibility to humans. Stream sections most suitable for harlequin breeding had gradients less than 10 degrees and banks lined with dense perennial shrubs; breeding and brood rearing occurred on streams with a mean gradient less than 30 degrees. In Idaho hens nest in cliff cavities, tree cavities, and on the ground.

Management

There is no specific management for harlequins in Montana; however, continued survey and monitoring efforts by MNHP have identified migration areas used by harlequin ducks.

In 1990 the harlequin duck was identified as potentially imperiled in western Montana. By 1991 it was considered as a candidate for listing on the federal threatened or endangered species list. Considered a sensitive or indicator species, it is among the first species to reflect damage to the type of pristine environments where it remains (Street 1999). The Harlequin Duck Working Group (1993) has identified inventory needs for both the Atlantic and Pacific populations for wintering and breeding habitats.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Range and forest management practices	Manage grazing to maintain riparian vegetation and streambank stability in excellent condition
	Continue survey efforts to find occupied streams throughout its range in the state, and to develop and track a statewide population estimate
Human disturbance by paddlers (especially in breeding season)	Decrease human disturbance such as boating, hiking, and camping during breeding season
Water pollution on headwater streams utilized for nesting, brood rearing, and prey base	Work with agencies, organizations and public to identify and reduce point source pollution in headwater streams
Destruction of watershed stability and stream flow regimes. High water during nesting and brood rearing can reduce or eliminate productivity. Low water will render feeding and brood rearing habitats unavailable	Avoid increasing peak flows during nesting season
	Avoid increasing sedimentation
Impoundments and diversions on breeding streams	Reduce streambank or channel alteration along breeding habitat

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Bald Eagle (*Haliaeetus leucocephalus*)

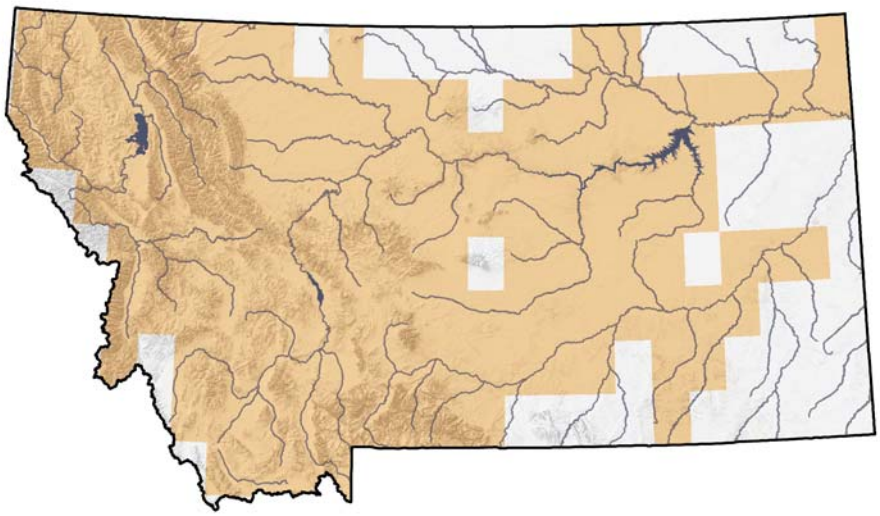

Figure 72. Distribution of the Bald Eagle
(Distribution reflects entire range and does not discriminate betweem breeding and nonbreeding areas)

Range

The majority of birds nesting in Montana are found in the western third of the state, although breeding pairs may be found along many of the major rivers and lakes in the central portion of the state and along the Yellowstone and Missouri rivers to the eastern prairie lands (Montana Bald Eagle Working Group 1994; MBD 2003). East of the Continental Divide, the presence of bald eagles may be somewhat more seasonally dependent than in the western part of the state because migrants from more northerly climes travel through Montana to reach their wintering grounds farther south.

In recent years, one of the largest fall (mid-October to mid-December) migration concentrations (200 to 300 birds at any one time, close to 1,000 individuals throughout the season) to take advantage of spawning salmon occurred at Canyon Ferry Reservoir on the Missouri River, near Helena. Formerly, migrating bald eagles were known to gather in large numbers in Glacier National Park where spawning kokanee salmon were abundant. No evidence exists, however, that the eagles on the Missouri River were those that formerly congregated in Glacier National Park (Montana Bald Eagle Working Group 1994). Subsequent shifting of fall congregations is expected as salmon populations peak and wane throughout the eagle's migration corridor. See the Montana Bald Eagle Management Plan for further details and descriptions of recovery zones (Montana Bald Eagle Working Group 1994).

Habitat

In Montana, as elsewhere, the bald eagle is primarily a species of riparian and lacustrine habitats (forested areas along rivers and lakes), especially during the breeding season. Important year-round habitat includes wetlands, major water bodies, spring spawning streams, ungulate winter ranges, and open water areas (Bureau of Land Management 1986). Wintering habitat may include upland sites. Nesting sites are generally located within larger forested areas near large lakes and rivers where nests are usually built in the tallest, oldest, largest diameter trees. Nesting site selection is dependent upon maximum local food availability and minimum disturbance from human activity (Montana Bald Eagle Working Group 1994). See the Montana Bald Eagle Management Plan (1994) for further details including home range sizes and habitat requirements of fledgling birds.

Management

General objectives of habitat management for bald eagles in Montana include maintaining prey bases; maintaining forest stands currently used or suitable for nesting, roosting, and foraging; planning for future potential nesting, roosting, and foraging habitat; and minimizing disturbances from human activities in nest territories, at communal roosts, and at important feeding sites, including water (MBEWG 1991). The Montana Bald Eagle Management Plan (MBEWG 1994) directs management of this species in the state. Specific objectives identified in the plan include a minimum of 800 nesting pairs in the seven-state recovery area, 99 of these in Montana; nesting success rate of 65 percent in occupied sites over a five-year period with annual average production of 1.0 fledged young per pair; population goals realized in at least 80 percent of management zones with nesting potential; and continued population increases for five consecutive years. See the Habitat Management Guide for Bald Eagles in Northwestern Montana (MBEWG 1991) and the Montana Bald Eagle Management Plan (MBEWG 1994) for further details on management guidelines and recovery objectives. The bald eagle is a good example of a success story—a species that has increased significanltly in population since its addition to the Endangered Species Act.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Maintaining forest stands currently used or suitable for nesting, roosting, and foraging	Continue periodic monitoring and surveying for breeding pairs and locations of nests
Sensitive to human disturbance particularly if activity occurs after nest initiation and prior to fledging	Minimize disturbance within and near nesting territories during the nesting season
	Development of and updated brochure on living with bald eagles

Water turbidity caused by human activity, rendering water unsuitable for foraging	Follow MBEWG guidelines of no more than 10 percent of shoreline be developed on lakes within occupied nesting territories
Contaminants (lead, residual pesticides)	Enforcement of regulations that address the dumping of pollutants into waterways

Management Plans

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Greater Sage-Grouse (*Centrocercus urophasianus*)

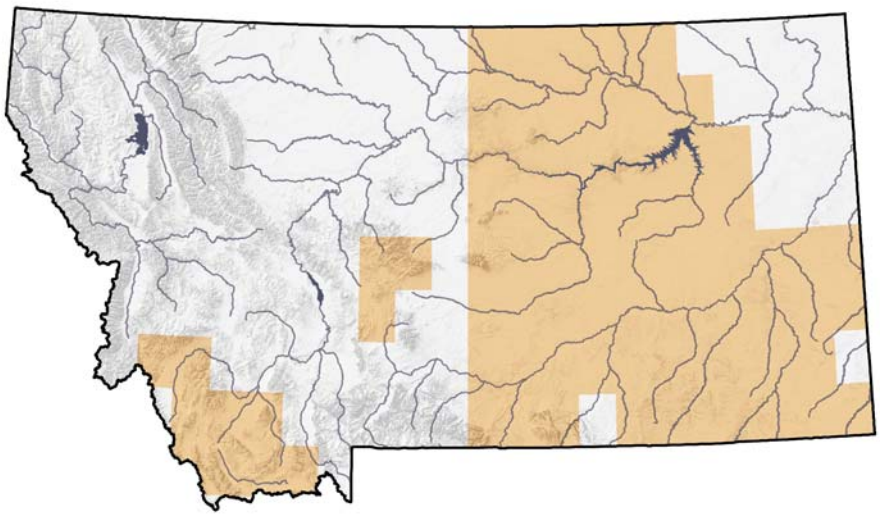

Figure 73. Distribution of the Greater Sage-Grouse
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Greater sage-grouse are native to the sagebrush steppe of western North America, and their distribution closely follows that of sagebrush, primarily big sagebrush (*Artemisia tridentata*). Distribution of greater sage-grouse in Montana includes the eastern half and southwest corner of the state—roughly 27 million acres (11 million hectares) of sagebrush grassland in 39 counties. In eastern Montana, where close interspersion of wintering, nesting, and brood rearing habitat rarely require large seasonal movements, greater sage-grouse are essentially nonmigratory. Some greater sage-grouse in southwestern Montana are migratory, moving between separate summer and winter areas.

Historically, greater sage-grouse occupied the Bitterroot Valley in western Montana, southwestern Montana, most of eastern Montana, and far western North Dakota and South Dakota (Schroeder et al. 2004). One specimen was collected near Missoula, Montana, as late as 1900. Today, greater sage-grouse distribution is more restricted in Montana, South Dakota, and North Dakota and is found on two national forests—Custer and Beaverhead-Deerlodge.

Habitat

Healthy, properly functioning sagebrush communities support greater sage-grouse and a variety of other native wildlife. Sagebrush communities in each of the sagebrush ecotypes are influenced by a variety of environmental variables. Among these variables are soil texture, moisture regime, past fire activity, past

herbicide spraying, topography, grazing history, grazing accessibility, and recent weather pattern. The characteristics of vegetation at any particular site are the result of superimposed environmental variables. Close examination of a functional sagebrush community reveals these factors at work in the form of a patchwork of shrubs, grasses, and forbs of varying heights, canopy coverage, and species. Individual patches within the landscape can be measured at a microsite level, such as a nest site, or can be extended to include a broader scale, which might be used to describe greater sage-grouse wintering areas. Greater sage-grouse have adapted to and require this naturally occurring patchwork to meet yearlong survival and reproduction needs (Connelly et al. 2000b).

Greater sage-grouse select specific habitat characteristics in response to season and life stage. During the spring breeding season, males congregate on display areas to attract females. Leks, which usually consist of clearings surrounded by sagebrush, are revisited annually. About two-thirds of greater sage-grouse nests are located within 2 miles of a lek. Hens generally nest under stands of sagebrush 12 to 20 inches or more in height, seeking taller shrubs in a stand for nesting. Grasses and forbs provide additional nest concealment from predators. After eggs hatch, hens seek relatively open sagebrush stands with more than 15 percent grass and forb canopy cover. Insects and succulent forbs provide critical food for young broods. As summer progresses and upland forbs desiccate, hens will move broods to moist sites along drainages, ditches, or irrigated meadows/hay crops. In general, moist areas with standing herbaceous cover, for concealing broods from predators, interspersed with sagebrush grasslands provide high-quality brood habitat. Improvements in native grass and forb height and density generally translate into better nest success and brood survival. During late fall and winter, greater sage-grouse feed almost exclusively on sagebrush. Deep snow conditions force greater sage-grouse to move to areas of exposed sagebrush both for food and cover. Wintering greater sage-grouse prefer extensive stands of sagebrush with at least 20 percent canopy cover.

Contiguous large blocks of healthy sagebrush grassland are best suited for meeting yearlong needs of greater sage-grouse. Limited seasonal habitats (e.g., nesting cover, brood rearing habitat, winter habitat, etc.) may restrict the abundance, productivity, or occurrence of greater sage-grouse in a particular area.

Management

Greater sage-grouse are managed under state authority, including the statutory authority to regulate harvest. Legislative mandate designates the greater sage-grouse as an upland game bird (87-2-101, MCA).

FWP, in conjunction with federal land management agencies and conservation groups, monitors greater sage-grouse populations during spring through a

census of displaying males on leks. The post-harvest telephone survey provides an estimate of harvest for all upland bird species, trends in hunter numbers, and number of birds by species taken by hunters. FWP uses wings from harvested greater sage-grouse to estimate composition of the harvest by sex and age.

State-funded cooperative habitat projects have the potential to benefit greater sage-grouse. In 1987 the Montana legislature created a process and funding source for FWP to purchase conservation interests in important wildlife habitats through conservation easements and fee title acquisitions. The program generates funding from an earmarked portion of license revenue and provides an innovative tool to protect habitat at the state level. The Upland Game Bird Habitat Enhancement Program was developed through a series of Montana legislative sessions from 1987 to 2001. This program funds habitat enhancements on private and public lands such as vegetation plantings, grazing management systems, and leases. The program has recently helped fund (in combination with the USFWS Landowner Incentive Program) the Montana Sagebrush Initiative, which is a 30-year private land lease program designed to conserve high-priority sagebrush grasslands from prescribed fire, herbicide applications, plowing, and other practices intended to reduce or eliminate sagebrush and forbs.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Conversion of native sagebrush grassland to cropland or non-native pasture	Promote conservation of intact sagebrush grassland landscapes through incentives and easements
	Guided by the Montana Greater Sage-Grouse Conservation Plan, utilize local working groups, organizations, and agency partnerships to promote and expand greater sage-grouse conservation
Rangeland treatments (e.g., prescribed fire and spraying)	Avoid use of rangeland herbicides and prescribed fire
Fragmentation of sagebrush grasslands (e.g., structural developments, roads, urban sprawl)	Develop and implement a habitat monitoring system to determine landscape-level trends in sagebrush grasslands
Range management practices	Support livestock grazing management that maintains or improves native rangeland integrity and provides standing herbaceous cover, important for nesting and brood rearing

Human disturbance	Quantify impacts of energy development and determine ways to reduce, eliminate, or mitigate negative effects
Noxious weeds	On a smaller scale, monitor trends in habitat condition (e.g., native rangeland integrity, habitat function, invasive weeds)
Vulnerability to West Nile virus	Continue funding and research on associations between West Nile virus and Greater Sage-grouse populations
Lek use and availability in association with other habitat uses	As needed, determine local greater sage-grouse habitat use and movements
	Develop and implement a lek monitoring strategy that will accurately measure trends in greater sage-grouse abundance and distribution across their range
	Continue to inventory greater sage-grouse leks and wintering areas

Management Plans

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Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*)

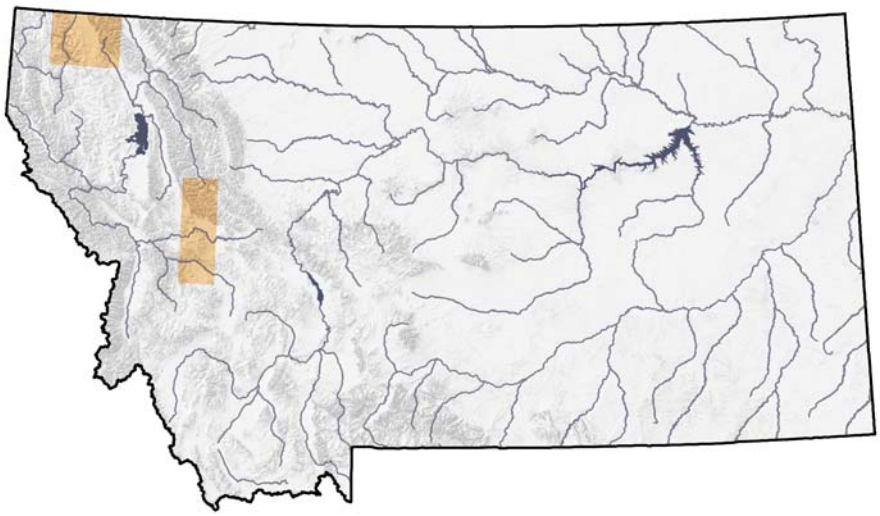

Figure 74. Distribution of the Columbian Sharp-tailed Grouse
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The Columbian sharp-tailed grouse is one of six recognized subspecies of sharp-tailed grouse that occur in North America (AOU 1957). Historically, the Columbian subspecies ranged in suitable habitats from British Columbia south through eastern Oregon and Washington, Idaho, western Montana, Wyoming and Colorado, and northern Utah, Nevada, and California (Ulliman et al. 1998). There have been significant regional and local declines and extirpations; its geographic distribution has contracted by an estimated 90 percent (Aldrich 1963: Miller and Graul 1980). Currently, there are three meta-populations of Columbian sharp-tailed grouse: one in Colorado/Wyoming, one in Idaho/Utah, and one in central British Columbia. Smaller population centers are found in south-central Idaho/northeast Nevada, north-central Washington, and northeast Oregon (USFWS 1999).

Montana recently supported a very small population of Columbian sharp-tailed grouse in the Tobacco Valley near Eureka. Only one lek is known to exist in this area, which is located on land held by The Nature Conservancy. There has been no known use of the lek during the past three years (T. Their, personal communication). Counts of males on the lek varied from a high of 33 in 1971 to the recent low. This population was supplemented with birds from British Columbia on two occasions.

Flocks of sharp-tailed grouse also occur in the Helmville area of Powell County. These have traditionally been considered the Columbian subspecies. Given their

geographic nearness to the plains subspecies, however, there may be genetic interchange with plains birds. Although a genetics study has shown similarities between a very small sample of Helmville birds and sharp-tailed grouse from Washington (Warheit and Schroeder 2001), there does not appear to be conclusive evidence identifying the Helmville birds as the Columbian subspecies.

Habitat

Columbian sharp-tailed grouse are associated with intermountain shrub grassland habitats including sagebrush grasslands and deciduous riparian and foothill shrub habitats. Brood sites are similar to nest sites, but they are usually close to broad-leaved brush patches or shrubby riparian zones. Sharp-tailed grouse need habitat with moderate vegetative cover, high plant diversity, and high structural diversity (Montana Partners in Flight 2004). Tall broad-leaved mountain shrub and riparian cover types are critical components of winter habitat for sharp-tailed grouse (Saab and Marks 1992). They often move to higher elevations to get into moister sites that support greater amounts of these types of shrubs (Ulliman et al. 1998). Suitable winter sites need to be no more than 4 miles from leks to be useful to sharp-tails (Ulliman et al. 1998).

In Montana, Columbian sharp-tailed grouse persist only on native bunchgrass-shrub stands (Mussehl et al. 1971; Montana Natural Heritage Program 2004). In some areas, conversion of native habitats to cropland, range management, and/or herbicide use has resulted in loss of native grasses, forbs, and woody vegetation, which are habitat components necessary for providing shelter from winter weather, protection from predators, nesting cover, and food (Mussehl et al. 1971; Montana Natural Heritage Program 2004). Over the past 15 years, much of the historical Columbian sharp-tailed grouse habitat in western Montana has been subject to considerable urban development, resulting in further habitat fragmentation, likely increases in nest-predator abundance, and reduced habitat function. Self-sustaining populations of sharp-tailed grouse require thousands of acres of intact habitat; large blocks of cropland or urban developed habitat are not conducive for supporting sustainable populations (Ulliman et al. 1998). Sharp-tailed grouse habitats associated with the Helmville and Eureka areas are not considered sufficient to support viable populations over time (Montana Partners in Flight 2004).

Management

As there is only one, possibly two, small populations of Columbian sharp-tailed grouse in Montana, critical efforts must be maintained to encourage individuals to seek and use lek areas. Careful population counts must be made, as well as counts of nesting sites and breeding success. Counting individuals at leks is the easiest way to monitor population trends. Wildlife agencies monitor leks because their size and density provide an index to populations and indirectly reflect changes in habitat quality (Cannon and Knopf 1981; Giesen and Connelly 1993).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Isolated and extremely small population	Increase abundance and distribution of Columbian sharp-tailed grouse with reintroduction program into northwest Montana that includes the development of a captive rearing facility
	Monitor existing populations to determine if management actions are adequate
	Identify validity of Blackfoot population as Columbian subspecies
Human disturbance to leks	Protect known lek areas and surrounding habitats within 2 kilometers, and search for new leks in areas with appropriate physiographic and vegetative characteristics
	Prohibit physical, mechanical, and audible disturbances within the breeding complex during the breeding season (March to June), if they might impact courtship activities and breeding during the daily display period (within three hours of sunrise and sunset)
	Avoid pesticide use on Columbian sharp-tailed grouse habitats
Conversion of native grassland and shrub/grass communities to agriculture and other unsuitable land uses	Solicit cooperation and communication between land managers and landowners in managing habitat
	Coordinate with British Columbia to manage suitable habitat in the Tobacco Plains area
Encroachment of conifers onto grassland habitat	Use prescribed fire to stimulate growth and vigor of deciduous shrubs in wintering areas, as long as a minimum of 10 percent of habitat will provide shrub cover during the recovery period of the burned area
Range management practices	Develop livestock management plans, which favor maintenance or enhancement of bunchgrass communities, forbs species diversity, and upland shrubs
	Develop appropriate grazing regimes in areas of known populations
	Fence areas of deciduous trees and shrubs (especially in riparian areas) to manage livestock

Invasion of non-native annual vegetation	Avoid manipulation or alteration of vegetation within the breeding complex (lek and nesting areas) during the nesting period (mid-April to June)
Predation on nests by ravens and other predators	Protect, maintain, and enhance winter, breeding, and nesting habitats near known populations

Management Plans

Casey, D. 2000. Partners in Flight Bird Conservation Plan Montana Version 1.0. Montana Partners in Flight. Kalispell, MT.

Wood, M. 1991. Management plan for Columbian sharp-tailed grouse in western Montana.

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Yellow Rail (*Coturnicops noveboracensis*)

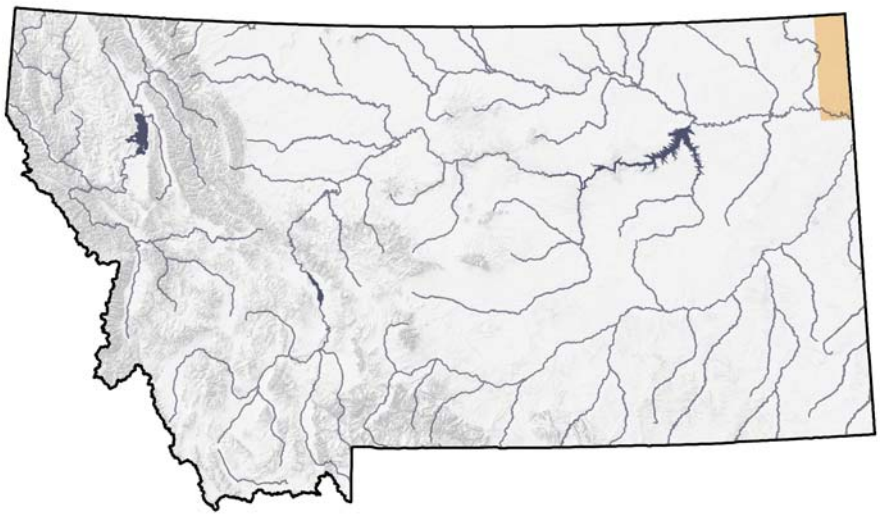

Figure 75. Distribution of the Yellow Rail
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

With fewer than 20 known observations in the state, this species is considered rare. Wright (1997) indicates that the yellow rail is known to occur regularly in the northeastern corner of the state and is rare elsewhere. The first recorded observation in the state was reported in Medicine Lake in 1943. Other sightings of the species have occurred across the state, with reports from the East Bay of Flathead Lake (the farthest west the species has been reported in the state), Red Rock Lakes, Huntley (Yellowstone County), the Bowdoin National Wildlife Refuge, and Westby (Montana Bird Distribution 2003).

Habitat

Breeding habitat selection is similar to that of other locations and consists of wet sedge (*Carex* spp.) meadows and other wetlands containing grasses, rushes (*Juncus* spp.), and bulrushes (*Scirpus* spp.) (Northern Prairie Wildlife Research Center 2003). Presence of the yellow rail is most commonly dictated by water depth, specifically one that fluctuates throughout the breeding season, i.e., wet in the early part of the breeding season and relatively dry (no standing water) by July or September (Northern Prairie Wildlife Research Center 2003).

Management

Outside of the national wildlife refuges, no management activities are known that specifically address conservation of yellow rails in Montana. Yellow rails are a

Species of Management Concern in USFWS Region 6 (U.S. Fish and Wildlife Service 1995).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Little known information in Montana	Increased survey and monitoring projects
Human disturbance of wetland habitats	Conservation practices of wetlands
Water level manipulation at nesting locations	Manage reservoirs and dammed rivers in a manner that mimics more natural seasonal fluctuations

Management Plans

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Kushlan, James A., Melanie J. Steinkamp, Katherine C. Parsons, Jack Capp, Martin Acosta Cruz, Malcolm Coulter, Ian Davidson, Loney Dickson, Naomi Edelson, Richard Elliot, R. Michael Erwin, Scott Hatch, Stephen Kress, Robert Milko, Steve Miller, Kyra Mills, Richard Paul, Roberto Phillips, Jorge E. Saliva, Bill Sydeman, John Trapp, Jennifer Wheeler, and Kent Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, DC. 78 pp.

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Wright, P. L. 1997. Status of Rare Birds in Montana, With Comments on Known Hybrids. Northwestern Naturalist 77:57–85.

Whooping Crane (*Grus americana*)

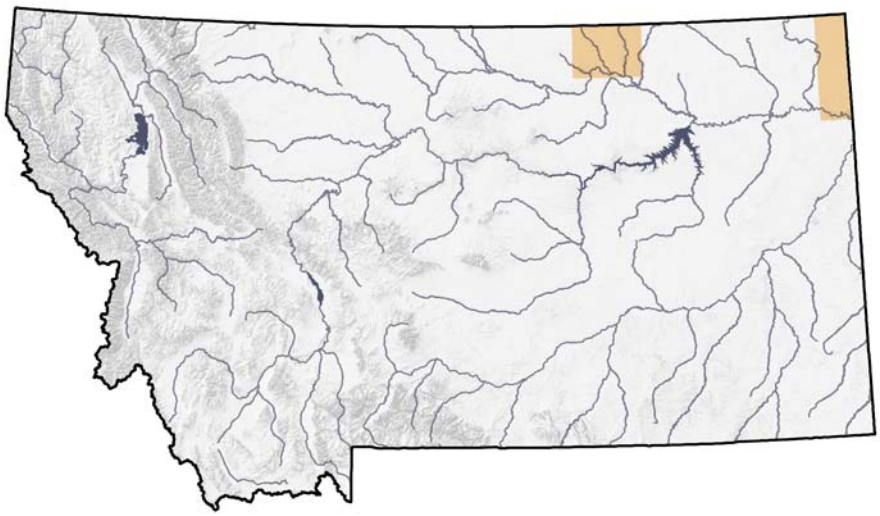

Figure 76. Distribution of the Whooping Crane
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The earliest report of a whooping crane in the state is credited to Maximilian, Prince of Wied, for his observation of a flock of a few individuals above the mouth of the Musselshell River in September 1833 (Skaar, unpublished notes). Skaar (unpublished notes) also indicates that reports of this species for the next 90 years were scarce: singular reports exist for Big Sandy (1903), Terry (1904), and Billings (1918).

Individual, transient whooping cranes have been reported throughout the eastern portions of the state, with most of those records for Sheridan (Medicine Lake National Wildlife Refuge) and Roosevelt counties (MBD 2003). Historical observations of the species in the west-central portion of the state are also recorded; those reported the farthest west include observations in Gallatin County (west of Bozeman) in 1967 and Broadwater County (northwest of Townsend) in 1979 (Skaar, unpublished notes). For the past 20 years, observations have been restricted to the northeastern corner of the state, with limited sightings of individuals at Red Rock Lakes National Wildlife Refuge. Reports of the birds from Red Rock Lakes are the result of the reintroduction effort to establish a population at Grays Lake, Idaho, which was a nonreproducing flock. The last bird observed at Red Rocks was seen in 2002, and it is presumed that since the Grays Lake flock is no longer extant, whooping cranes will most likely not be seen at Red Rock Lakes until another regional population is established. The birds observed in the eastern corner of Montana

are occasional migrants traveling through from the Aransas population on their journey to breeding grounds in Alberta and the Northwest Territories.

Habitat

The whooping crane has been observed and breed at or within the marsh habitat present at Medicine Lake National Wildlife Refuge and Red Rock Lakes National Wildlife Refuge. Observations of individual birds in other areas of the state include grain and stubble fields as well as wet meadows, wet prairie habitat, and freshwater marshes that are usually shallow and broad with safe roosting sites and nearby foraging opportunities (MBD 2003).

Management

Efforts continue to protect and restore wetlands in the northeastern corner of Montana, in the area where whooping cranes have migrated in the past. There are also continued efforts to educate crane and waterfowl hunters on the identification of whooping cranes in an effort to avoid accidental harvest.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat degradation and fragmentation of native prairies	Habitat conservation in northeast Montana (outside Medicine Lake NWR)
Human disturbance to nesting locations	Prohibition of public access to breeding locations, including aircraft
	Periodic census to evaluate productivity
Potential petroleum spills in the wintering areas of Port Aransas	Work with other states to continue conservation efforts for Whooping crane
Human misidentification as sandhill cranes during hunting season	Hunter education

Management Plans

Kushlan, James A., Melanie J. Steinkamp, Katherine C. Parsons, Jack Capp, Martin Acosta Cruz, Malcolm Coulter, Ian Davidson, Loney Dickson, Naomi Edelson, Richard Elliot, R. Michael Erwin, Scott Hatch, Stephen Kress, Robert Milko, Steve Miller, Kyra Mills, Richard Paul, Roberto Phillips, Jorge E. Saliva, Bill Sydeman, John Trapp, Jennifer Wheeler, and Kent Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, DC. 78 pp.

Olsen, David L. 1980. Whooping Crane Recovery Plan. Whooping Crane Recovery Team (USFWS, Nebraska Game and Parks Commission, Texas Parks & Wildlife Department, National Audubon Society). 206 pp.

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Piping Plover (*Charadrius melodus*)

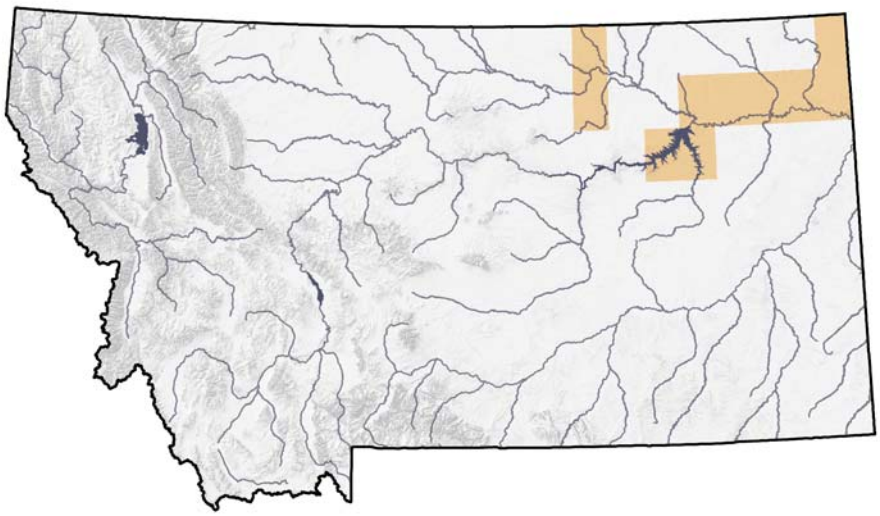

Figure 77. Distribution of the Piping Plover
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Piping plovers are limited to the open shorelines of freshwater or alkaline lakes, reservoirs, rivers, or wetlands. The piping plover is generally a species of northern and northeastern Montana. This species is known to breed in Medicine Lake National Wildlife Refuge, Sheridan County, the Missouri River below Fort Peck Dam, Fort Peck Reservoir, Nelson Reservoir, Bowdoin National Wildlife Refuge (occasionally), and Alkali Lake (Montana Piping Plover Recovery Committee (MPPRC) 1994; Montana Bird Distribution 2003).

Observations of nonbreeding individuals have been recorded at Freezeout Lake Wildlife Management Area, the south end of Canyon Ferry Reservoir, and Park County (MPPRC 1994; Montana Bird Distribution 2003), though it is presumed the species uses other appropriate habitat in the state during migration.

The piping plover usually arrives in Montana in early May and leaves the state by late August. The earliest reported observation dates for the species are April 28, Fort Peck Reservoir (MPPRC 1994) and April 28, Upper Goose Lake, Sheridan County (Montana Bird Distribution 2003). Most of the observations reported in the state are for breeding individuals or for activity that suggests breeding.

Reports of piping plovers during migration are not common, but do occur just east of the Rocky Mountains (Montana Bird Distribution Committee 1996). Although they were known to breed at Bowdoin National Wildlife Refuge and Fort Peck Reservoir, little attention was paid to the species prior to its listing in 1985.

As a result, few observations are recorded prior to 1985 (Montana Bird Distribution 2003).

Habitat

Piping plovers primarily select unvegetated sand or pebble beaches on shorelines or islands in freshwater and saline wetlands. Vegetation, if present at all, consists of sparse, scattered clumps (Casey 2000). Open shorelines and sandbars of rivers and large reservoirs in the eastern and north-central portions of the state provide prime breeding habitat (MFWP 2003). In Montana and throughout the species' range, nesting may occur on a variety of habitat types. If conditions are right, alkali wetlands, lakes, reservoirs, and rivers can all provide the essential features required for nesting. The alkali wetlands and lakes found in the northeastern corner of the state generally contain wide, unvegetated, gravelly, salt-encrusted beaches. Rivers that flood adequately can supply open sandbars or gravelly beaches, as can large reservoirs, with their shoreline beaches, peninsulas, and islands of gravel or sand (USFWS 2003).

Sites with gravel substrate provide the most suitable sites for nesting (MPPRC 1994). One of the most limiting factors to nesting site selection is vegetation encroachment; piping plovers avoid areas where vegetation provides cover for potential predators. Fine-textured soils are easier to treat mechanically than rocky or gravelly soils when vegetation is determined as a limiting factor in an area's ability to provide suitable nesting habitat, but fine soils are not typically a preferred nesting substrate (MPPRC 1994). Another, and more important, limiting factor in nest site selection is the location of nesting sites in relation to surrounding water levels. Nests are often inundated because water levels are kept unnaturally high throughout the breeding season (and high winds can cause nests to be flooded), or nesting sites are not available, either because of encroaching vegetation or because water levels are so high that beaches are underwater during the early part of, and possibly throughout, the nesting season (MPPRC 1994). Nests are simple scrapes dug into the nest substrate, which may or may not be lined with pebbles (MPPRC 1994, 1995; Haig 1992).

Management

Four specific geographic areas recognized as providing critically important habitat and identified as essential for the conservation of the species have been designated as "Critical Habitat Units" in Montana by USFWS. The designation of critical habitat may require federal agencies to develop special management actions affecting these sites. The four units include prairie alkali wetlands and surrounding shoreline; river channels and associated sandbars and islands; and reservoirs and inland lakes with associated shorelines, peninsulas, and islands (USFWS 2003). Piping plovers rely on these places for courtship, nesting, foraging, and brood rearing. The first, Unit 1, contains alkali lake and wetland habitat found in Sheridan County. Unit 2 is identified as riverine habitat and

includes the Missouri River just south of Wolf Point to the state line, encompassing habitat provided by the sparsely vegetated sandbars and sandy or gravelly beaches along this stretch of the river. Reservoirs, which include similar sandbars and sandy or gravelly beach habitat, define both Units 3 and 4. Unit 3 includes Fort Peck Reservoir, from south of the dam to and including approximately 26 miles (north to south distance) of the length of Dry Arm. Portions of the Bowdoin National Wildlife Refuge, the majority of Lake Bowdoin, and the western portion of Dry Lake, were designated as Unit 4. Piping plovers nest at Nelson Reservoir north of the Bowdoin National Wildlife Refuge, but are not contained within any of the Critical Habitat Units in the state. This reservoir was excluded from the critical habitat designation because of a memorandum of understanding between the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and the local irrigation districts. The memorandum, in combination with a biological opinion from the USFWS, guides management actions at this location (USFWS 2003).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Destruction and degradation of summer and winter habitat	Protection of as much existing native prairie as feasible, primarily by conservation easements
	Conservation practices, including education, for nest locations which includes nest movement to safer areas
Shoreline erosion	Restoration of drained wetlands
Loss of nesting sites by high water levels	Timing spring flow releases from Fort Peck Dam to more closely mimic the natural seasonal flows of the river
Human disturbances of nesting and foraging birds	Avoid oil and gas development near wetlands
Predation	Direct predator management

Management Plans

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

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Haig, S. M. 1992. Distribution and status of piping plovers in winter. Abstract, 6th Annual Meeting of the Society for Conservation Biology, pp. 69.

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Montana Piping Plover Recovery Committee. 1995. 1994 surveys for piping plover (*Charadrius melodus*) and least tern (*Sterna antillarum*) in Montana. 117 pp. + appendices.

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U.S. Fish and Wildlife Service. 2003. Online informational search on piping plover in Montana. http://mountain-prairie.fws.gov/pipingplover/Piping_Plover_Q&A_Sept5.htm.

Mountain Plover (*Charadrius montanus*)

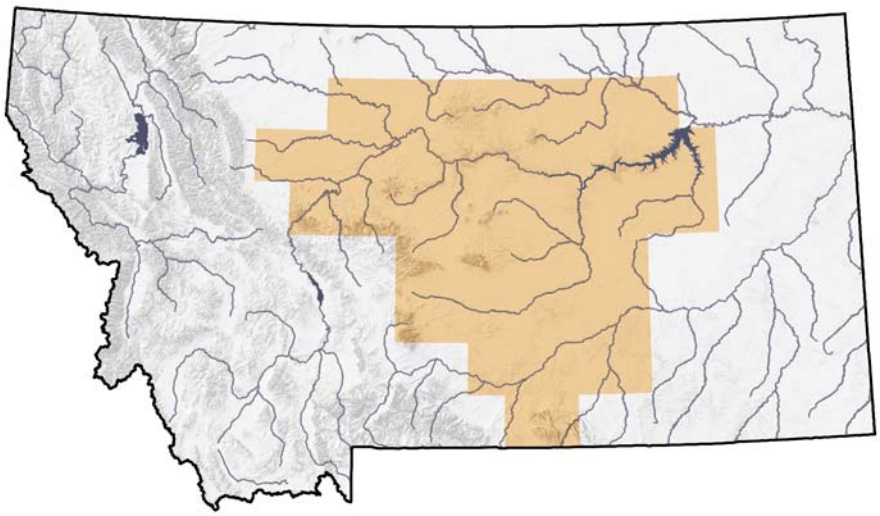

Figure 78. Distribution of the Mountain Plover
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Primary breeding habitat of the mountain plover is found in the north-central portion of the state in Phillips, Blaine, and northern Fergus and Petroleum counties (FaunaWest 1995). This area contains the largest population of mountain plovers in Montana, with additional breeding areas in the state in Valley County (Little Beaver Creek) in the northeastern portion of the state; in Wheatland, Golden, and Musselshell counties near the Little Belt, Big Snowy, and Little Snowy mountains in central Montana; and in Jefferson, Madison, and Broadwater counties in the southwestern portion of the state (FaunaWest 1995). Additionally, surveys in 2003 revealed mountain plovers in Big Horn, Carbon, Fergus, Hill, Petroleum, Rosebud, and Treasure counties (Federal Register 68).

Mountain plovers arrive in April and may remain in the state as late as early October (Johngard 1986; Dinsomore 2001; Grensten 2005). The species is a rare migrant west of the Continental Divide, but is a breeding resident of the prairie lands to the east.

Habitat

Habitat use in Montana appears similar to other areas within the species' global breeding range, i.e., use of prairie dog colonies are primarily used in Montana; however, other short-grass prairie sites are confirmed as preferred breeding habitat. Records indicate the species utilizes towns of both white-tailed (*Cynomys leucurus*) and black-tailed prairie dogs (*Cynomys ludoviscianus*) (MBD

2003). Prairie dog towns provide greater horizontal visibility, a higher percentage of bare ground, refugia for consumption, and a higher diversity of forbs than adjacent areas (Olsen 1985). Mountain plovers will use towns as small as 3 hectares (Knowles et al. 1982); the average in one study was 57.5 hectares (Knowles and Knowles 1984), from 6 to 50 hectares in another study (Olson-Edge and Edge 1987), and from 2 to more than 150 hectares in another (Dinsmore 2001).

Primary habitat use in Montana during the breeding season includes heavily grazed, short-grass prairie sites. Habitat in Phillips and Blaine counties, the area containing the largest known populations of mountain plover in the state, is dominated by the native plant species *Bouteloua gracilis* and *Koeleria cristata.* This area also contains *Stipa comata*, *Agropyron smithii*, *Carex* spp., *Artemisia frigida*, *Opuntia polyacantha*, and *Gutierrezia sarothrae* (FaunaWest 1991). Knowles (1993) determined that in the northeastern portion of the state, mountain plover also selected sites associated with habitat dominated by *Atriplex gardneri* and *Eriogonum multiceps*, while use in the central and southwestern areas of the state was associated with *Bouteloua gracilis* and *Stipa comata*. Strong preference was also given to sites with slopes less than 5 percent and grass height of less than 6 centimeters (3 inches) (Knowles, Maj, and Hinckley 1995). Knowles (1993) indicates that sites selected within these habitat types were restricted to areas intensively grazed by prairie dogs, sheep, and/or cattle, especially those of the *Stipa comata* and *Bouteloua gracilis* habitat type (Knowles and Knowles 1997).

Management

Only the Bureau of Land Management (BLM) has some management activities specific to mountain plover; increased coordinated management activities in Montana are needed. However, the unifying habitat features desirable to mountain plovers are extremely short vegetation, a high percentage of bare soil, and an extensive area (0.5 to 1 kilometer in diameter) of nearly level terrain (Knowles and Knowles 1997). Management practices should emulate these parameters to ensure that these populations persist. Several studies have suggested specific conservation actions that could be taken to benefit mountain plover habitat (Wershler 1989; FaunaWest Wildlife Consultants 1991; Knopf 1991; Carter and Barker 1993; U.S. Fish and Wildlife Service 1995; Dinsmore 2001).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss of livestock grazing (increase in vegetation height above 4 inches or 30 percent cover)	Cooperate with resource users in order to support sustainable domestic livestock practices that promote mountain plover habitat

Invasive non-native plant species	Shrub and noxious weed encroachment should be controlled at known and potential breeding sites
Habitat loss of short-grass prairies due to conversion to cropland	Existing native grassland should be protected from conversion to cropland
Decrease in prairie dog colonies	Continued management and potential enhancement to prairie dog colonies

Management Plans

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Casey, D. 2000. Partners in Flight Bird Conservation Plan Montana Version 1.0. Montana Partners in Flight. Kalispell, MT.

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Grensten, John. 2004. Personal communication with Stephen Dinsmore.

Johnsgard, P. A. 1986. Birds of the Rocky Mountains with particular reference to national parks in the northern Rocky Mountain region. Colorado Associated University Press, Boulder, CO. 504 pp. + xi.

Knopf, F. L. 1991. Status and conservation of mountain plovers: the evolving regional effort. Report of research activities, USFWS National Ecology Research Center, Fort Collins, CO, 9 pp.

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Wershler, C. R. 1989. A management strategy for mountain plovers in Alberta. Proc. Prairie Cons. Endangered Species Workshop, Saskatchewan Natural History Society and Canadian Plains Resource Center. 5 pp.

Long-billed Curlew (*Numenius americanus*)

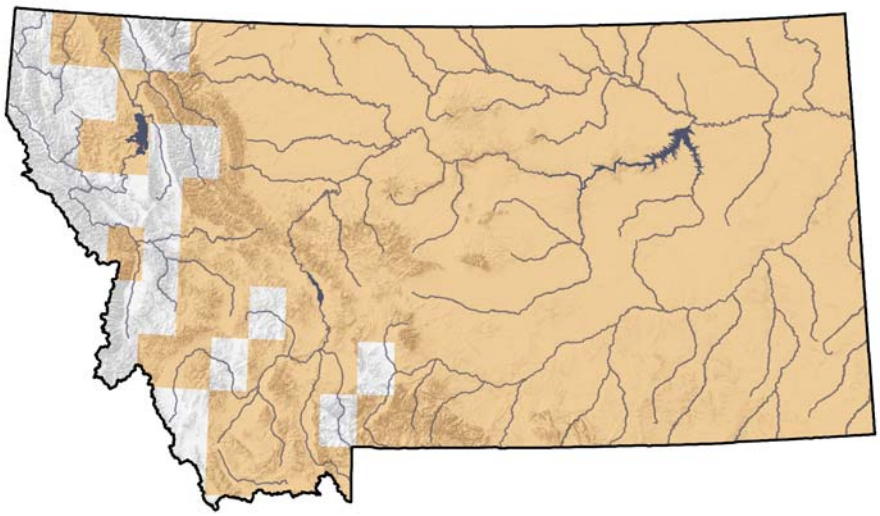

Figure 79. Distribution of the Long-billed Curlew
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The long-billed curlew breeds widely throughout the state, although it is more common east of the Rocky Mountains. Long-billed curlews do not overwinter in Montana.

Habitat

Long-billed curlews have four essential nesting habitat requirements in the northwestern United States: short grass (less than 30 centimeters, or 11.8 inches tall), bare ground components, shade, and abundant invertebrate prey. Long-billed curlews prefer native prairies but also occupy grazed mixed-grass communities and scrub prairies. Long-billed curlews probably select sites because of shortness of vegetation and the spacing of grass clumps. Because they rely on camouflage for protection of their eggs and themselves during incubation, the short grass presumably allows for better visibility of approaching danger, and the irregular pattern of grass clumps complements their cryptic coloration. They typically prefer areas with well-drained, gravelly soils and low, rolling terrain. Proximity to water may be another important factor in breeding habitat.

Management

Long-billed curlews are closely associated with grassland and shrub grassland habitats. Management should therefore be directed at protection and

enhancement of those habitats. Habitat areas need to be more than three times as large as a long-billed curlew's territory, which averages about 14 hectares (34.6 acres), in order for curlews to use them.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss (e.g., sodbusting, weed invasion, general conversion of prairie lands to other uses)	Prevent sodbusting, subdivision, and conversion of prairie lands to other land uses
Breeding habitat within state is either fragmented, unprotected, or mismanaged	Provide large blocks of suitable habitat
	Management activities and grazing should be delayed until after the breeding season (approximately July 15)
Human-directed disturbance to grassland habitats (disturbance includes impacts of cattle grazing, roads, and adjacent land activities, and may include pesticide application and draining of wetlands)	Maintain vertical structure through appropriate management techniques such as light grazing, haying, and occasional prescribed burning during nonbreeding season

Management Plans

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

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Interior Least Tern (*Sterna antillarum athalassos*)

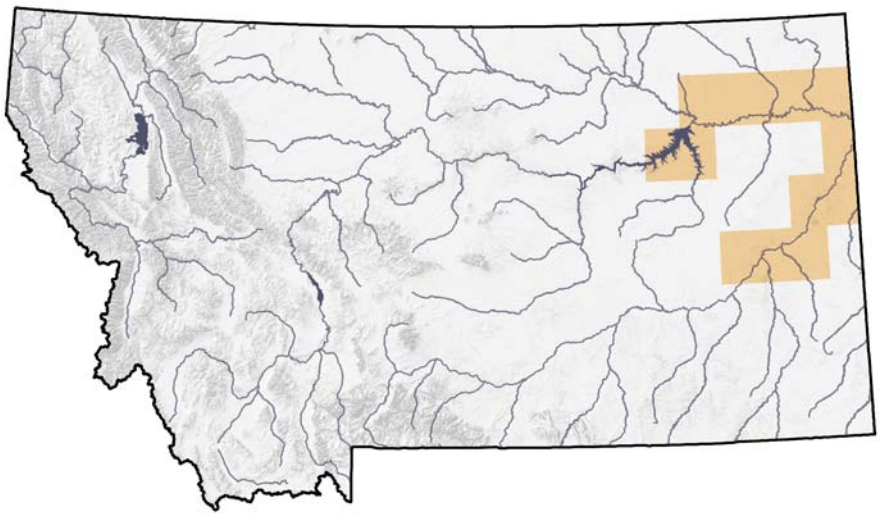

Figure 80. Distribution of the Interior Least Tern
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Montana defines the western portion of the interior least tern's range. The species breeds along the lower portions of the Missouri River below Fort Peck Dam, on the beaches of Fort Peck Reservoir, and on the Yellowstone River below Glendive. Records of transient individuals are few and are limited primarily to these same areas (Montana Bird Distribution 2003).

Habitat

Interior least terns nest on unvegetated sand-pebble beaches and islands of large reservoirs and rivers in northeastern and southeastern Montana, specifically the Yellowstone and Missouri river systems (Christopherson et al. 1992). These wide-open river channels and lake and pothole shorelines provide the preferred characteristics for nesting terns. Sites with a gravel substrate provide the most suitable sites for nesting (Montana Piping Plover Recovery Committee (MPPRC) 1994). One of the most limiting factors to nesting site selection is vegetation encroachment; terns avoid areas where relatively thick vegetation provides cover for potential predators. Fine-textured soils are easier to treat mechanically than rocky or gravelly soils when vegetation is determined as a limiting factor in an area’s ability to provide suitable nesting habitat, but fine soils are not typically a preferred nesting substrate (MPPRC 1994).

In Montana, as in other areas, another and more important limiting factor in nest site selection is the location of nesting sites in relation to surrounding water

levels. Nests are often inundated because water levels are kept unnaturally high throughout the breeding season (and high winds can cause nests to be flooded) or nesting sites are not available, either because of encroaching vegetation or because water levels are so high that beaches are underwater during the early part of, and possibly throughout, the nesting season (MPPRC 1994).

Management

As identified in the recovery plan for the interior least tern, delisting can be considered when four censuses confirm that the interior population has reached 7,000 and remains stable for at least ten years. The goal for the Missouri River system is 2,100 birds (census numbers in 2003 revealed 735 birds for the Missouri River in total) (Pavelka, personal communication 2003). Appropriate water management, which includes natural seasonal flows, is identified as the major consideration for interior least tern conservation in Montana, because the greatest threat to breeding pairs, in some years, is the loss of existing nesting sites from inundation by high water during the breeding season (MPPRC 1994).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Human use and predation on adults, eggs, and young by birds (e.g., kestrels, night-herons, crows, northern harriers, gulls) and mammals (e.g., foxes, skunks, weasels, opossum, rats, feral hogs, and domestic cats and dogs)	Predator control
	Control access of nest locations to humans
Chemical spills and pesticide or heavy metal pollution	Decrease point and nonpoint inputs of pesticides and heavy metals into rivers and floodplains
Human modification of river flow (e.g., reduction of spring floods by dams) and bank stabilization and channelization, resulting in reduced availability of bare island/sandbar nesting habitat	Decrease human modifications of flows on larger rivers and Fort Peck Reservoir
	Conservation of riparian areas in northeast Montana, decreasing human impacts
Loss of aquatic habitat diversity and resulting changes in fish species composition and abundance	Work with agencies, organization and public to support native species conservation

Unsustainable irrigation may be a threat by lowering water levels/flows and reducing river areas when terns are breeding	Beach enhancement

Management Plans

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Kushlan, James A., Melanie J. Steinkamp, Katherine C. Parsons, Jack Capp, Martin Acosta Cruz, Malcolm Coulter, Ian Davidson, Loney Dickson, Naomi Edelson, Richard Elliot, R. Michael Erwin, Scott Hatch, Stephen Kress, Robert Milko, Steve Miller, Kyra Mills, Richard Paul, Roberto Phillips, Jorge E. Saliva, Bill Sydeman, John Trapp, Jennifer Wheeler, and Kent Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, D.C. U.S.A., 78 pp.

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Black Tern (*Chlidonias niger*)

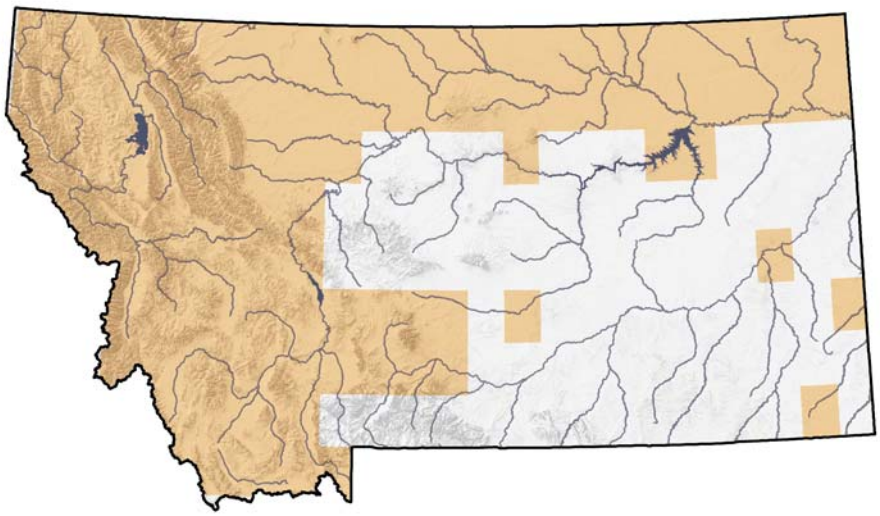

Figure 81. Distribution of the Black Tern
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Black terns have been documented breeding in 12 Montana counties, most located in the northern half of the state. From east to west they include Sheridan, Phillips, Blaine, Cascade, Teton, Ponderosa, Glacier, Powell, Flathead, and Lake counties. Breeding records also exist for Beaverhead County in southwest Montana and Carter County in the southeast corner of the state.

Unconfirmed breeding also has been recorded in at least five more counties (Montana Bird Distribution 2003; MNHP 2003). Even though breeding black tern colonies are located throughout many areas of Montana, this apparently wide-ranging distribution is misleading. Black terns are limited to breeding locations with appropriate habitat, size, and vegetative composition. These limitations likely account for their widely scattered distribution. Black terns can nest wherever appropriate habitat exists, but appropriate habitat in Montana is patchy at best.

Little information is known about black tern migratory patterns in Montana. They are more likely to move north from wintering locations in the interior of the United States (Dunn and Argo 1995), so early sightings should occur in southern portions of the state. Migrating black terns have been observed just north of Dillon as early as April. However, the majority of spring migration observations have been in May and June. Black terns have been observed in transit in July and August albeit fewer observations, probably due to peak breeding. The latest recorded observation was in September near Medicine Lake National Wildlife Refuge in Sheridan County (Montana Bird Distribution 2003). Migration in fall is

less concentrated through the interior of the country because the birds also move to coastal areas (Dunn and Argo 1995).

Habitat

Black tern breeding habitat in Montana is mostly wetlands, marshes, prairie potholes, and small ponds. However, several locations are on man-made islands or islands in man-made reservoirs. Across all Montana sites where black terns are present, approximately 30 to 50 percent of the wetland complex is emergent vegetation. Vegetation within known breeding colonies includes alkali bulrushes, canary reed-grass, cattail spp., sedge spp., rush spp., reed spp., grass spp., *Polygonum* spp., *Juncus* spp., and *Potamogeton* spp., indicating that a wide variety of potential habitats are usable by black terns. Water levels in known breeding localities range from about 0.5 meters to greater than 2.0 meters, with most having depths between 0.5 and 1.0 meters (MNHP 2003).

Management

Active management for black terns in Montana is currently limited to continued population monitoring and water level fluctuation control. Several black tern colonies are under federal or state control, and population monitoring at those locations is completed annually. This monitoring can range from basic observation counts to nest location surveys. At some sites, federal or state agencies also monitor and regulate water levels during the breeding season for black terns, as well as other wetland species and waterfowl.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss or degradation of wetlands for breeding and migration	Incorporate black tern habitats (known and potential) into any wetland restoration programs
	Undertake continued management actions at waterfowl management areas to reduce salinity and selenium concentrations
	Continued water level regulation on impounded rivers and reservoirs at nesting locations
Human disturbance in nesting colonies	Implement a public education and sighting program, similar to the program for common loon nesting sites
Lack of information	Continue monitoring at breeding locations

Pesticide reduction of favored insect foods	Reduce nutrient loading from runoff at known black tern nesting sites

Management Plans

Casey, D. 2000. Partners in Flight Bird Conservation Plan Montana Version 1.0. Montana Partners in Flight. Kalispell, MT.

Kushlan, James A., Melanie J. Steinkamp, Katherine C. Parsons, Jack Capp, Martin Acosta Cruz, Malcolm Coulter, Ian Davidson, Loney Dickson, Naomi Edelson, Richard Elliot, R. Michael Erwin, Scott Hatch, Stephen Kress, Robert Milko, Steve Miller, Kyra Mills, Richard Paul, Roberto Phillips, Jorge E. Saliva, Bill Sydeman, John Trapp, Jennifer Wheeler, and Kent Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas, Washington, D.C. U.S.A., 78 pp.

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Flammulated Owl (*Otus flameolus*)

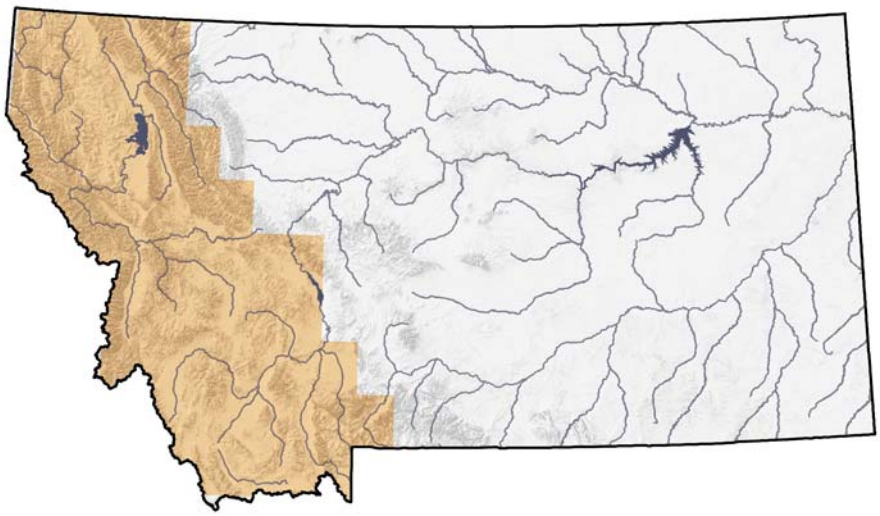

Figure 82. Distribution of the Flamulated Owl
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The range of flammulated owls in Montana is restricted to the western portion of the state, which includes areas east of the Continental Divide. Montana Bird Distribution notes eight observation records since 1996, with confirmed breeding in the Bitterroot Valley (Lenard et al. 2003). Additional breeding occurrences are confirmed in the Helena, Missoula, and Bozeman areas (Montana Bird Distribution Online Database 2001). Other areas of suspected breeding occur throughout western Montana. Low-elevation, old-growth ponderosa pine areas are especially important for flammulated owls.

Habitat

Information on breeding habitat in Montana is limited to one study in the Bitterroot Valley (Wright 2000). In Montana flammulated owls are associated with mature and old-growth xeric ponderosa pine/Douglas-fir stands (Holt and Hillis 1987; Wright et al. 1997) and in landscapes with higher proportions of suitable forest and forest with low to moderate canopy closure (Wright et al. 1997). They are absent from warm and humid pine forests and mesic ponderosa pine/Douglas-fir stands (McCallum 1994a; Wright et al. 1997). Information gathered from other studies throughout their range suggest the breeding habitat of flammulated owls is montane forest, usually open conifer forests containing pine with some brush or saplings (typical of the physiognomy of pre-European settlement ponderosa pine forests). The species shows a strong preference for ponderosa pine (*Pinus ponderosa*) and Jeffrey pine (*P. jeffreyi*) throughout its

range (McCallum 1994b). They prefer mature growth with open canopy and avoid dense young stands. Flammulated owls are found in a cooler, semiarid climate, with a high abundance of nocturnal arthropod prey and some dense foliage for roosting (McCallum 1994a). Most often they are found on ridges and upper slopes (Bull et al. 1990; Groves et al. 1997). The species may focus foraging in a few “intensive foraging areas” within the home range, averaging 1 hectare per range (Linkhart 1984, cited in McCallum 1994b).

In British Columbia, flammulated owls use dry interior Douglas-fir (*Pseudotsuga menziesii*) where ponderosa pine may be a codominant but pure ponderosa pine is avoided. A study in the Kamloops area testing a habitat model in Douglas-fir/ponderosa pine found three variables to be significant predictors for occupied habitat: elevation (between 850 and 1,150 meters), age class (older stands), and canopy closure (40 to 50 percent) (Christie and van Woudenberg 1997).

In Idaho they are found mostly in mature stands of ponderosa pine, Douglas-fir, or mixtures of the two with relatively open canopies (Atkinson and Atkinson 1990) and occasionally in stands of pure Douglas-fir or aspen where ponderosa pine is absent. In northeastern Oregon, nest trees were located in stands of old-growth ponderosa pine or mixed conifers near small clearings (Bull and Anderson 1978). In Colorado they show strong preference for old-growth ponderosa pine and Douglas-fir, using older trees for foraging and singing (Reynolds and Linkhart 1992; Linkhart and Reynolds 1997).

Territories consistently occupied by breeding pairs were those containing the largest portion (more than 75 percent) of old-growth (200 to 400 years), whereas territories occupied by unpaired males and rarely by breeding pairs contained 27 to 68 percent old-growth (Linkhart and Reynolds 1997). Aspen (*Populus tremuloides*) is often a component of nesting habitat in Colorado and Nevada (Reynolds and Linkhart 1987b; McCallum 1994b). In northern Utah the species has successfully nested in nest boxes in montane deciduous forests dominated by aspen with some scattered firs (Marti 1997).

Flammulated owls roost in dense vegetation and thickets that provide shade and protection from predators. They often roost close to the trunks of fir or pine trees, or in cavities (McCallum 1994b; USDA Forest Service 1994). In Oregon they use mixed coniferous forest rather than pure ponderosa pine (Goggans 1986, cited in McCallum 1994a). In Colorado large Douglas-firs or pines with a spreading form are used (Linkhart 1984, cited in McCallum 1994a). Flammulated owls roost close to nests (20 to 25 meters) during the nestling stage and just before fledging, and farther away before and after (McCallum 1994a). In British Columbia, they roost in regenerating thickets of Douglas-fir (Howie and Ritcey 1987). Migration habitat is in wooded and open areas in lowlands and mountains, including riparian areas and breeding habitat (McCallum 1994a).

Wright (1996) in the Bitterroot and Sapphire mountains in west-central Montana found flammulated owls in the breeding season related to the presence of snags and large trees near a nest area, openings at the territory scale, and the presence of low or moderate canopy closure in stands of ponderosa pine or Douglas-fir with a mosaic of grass/shrubs and forest edge.

McCallum (1994a) and Hayward and Verner (1994) provide substantive reviews of flammulated owl habitat, behavior, and general ecology. The preferred breeding habitat hosts a high diversity or abundance of nocturnal arthropods (primarily insects). Prey availability appears to be the primary factor for migration, and patterns in migration and winter habitat requirements are poorly known.

Management

No specific management activities for flammulated owls are currently occurring in Montana; however, management for old-growth ponderosa pine habitats is ongoing by a number of land management agencies, including the U.S. Forest Service (USFS). Management for this habitat type will be beneficial for flammulated owls in Montana. The USFS Region 1 designates the flammulated owl as a sensitive species.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss of old-growth forests	Conservation of old-growth forests
Inadequate monitoring efforts	Continue monitoring efforts, to include night monitoring
Found in cluster distributions so that one catastrophic event could lead to loss of population	Evaluate the quality and quantity of suitable but unoccupied habitat or habitat that would be suitable with restoration
Fire suppression	Consider use of prescribed fire near mature forest stands to reduce understory stocking and enhance the shrub component
Use of herbicides or insecticides near nests	Do not use insecticides near nest sites

Management Plans

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Burrowing Owl (*Speotyto cunicularia*)

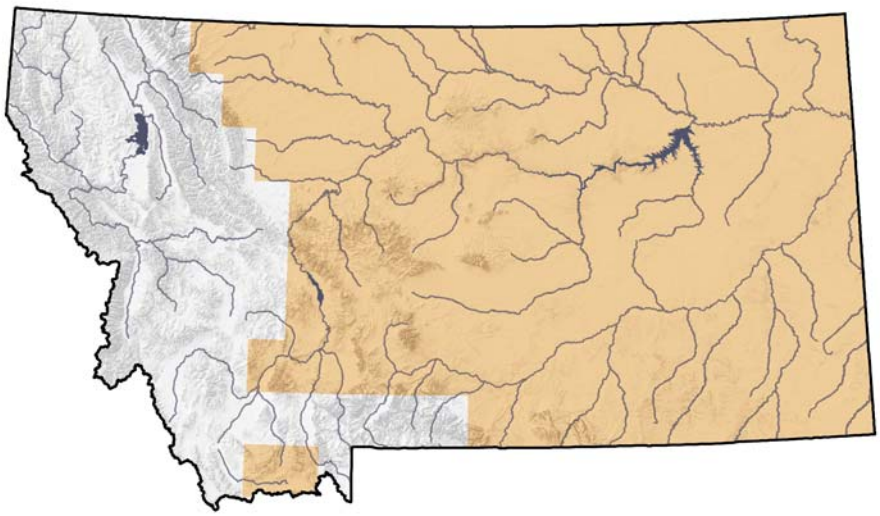

Figure 83. Distribution of the Burrowing Owl
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

Burrowing owls continue to be widely distributed in appropriate habitat east of the Continental Divide (Lenard et al. 2002).

Habitat

The burrowing owl breeds in habitats ranging from open grasslands (Orth and Kennedy 2001) to savanna and in some areas of human habitation (e.g., airports, golf courses, road rights-of-way) (Jones and Bock 2002). Areas used for breeding are often associated with burrows created by small mammals (e.g., prairie dogs, badgers, yellow-bellied marmots, and others) (Haug et al. 1993).

The presence of burrows is a critical habitat requirement and are often found abandoned by mammals in open grasslands. In Montana, black-tailed prairie dog (*Cynomys ludoviscianus*) and Richardson's ground squirrel (*Spermophilus richardsonii*) colonies provide the primary and secondary habitats for burrowing owls (Klute et al. 2003). The burrows may be enlarged or modified, making them more suitable. Burrowing owls spend much of their time on the ground or on low perches such as fence posts or dirt mounds.

Management

Wildlife managers outside of Montana have tried conservation actions such as the creation of artificial burrows and perches for burrowing owls and the regulation/protection of burrowing mammals. Successful approaches should be considered.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Elimination of burrowing mammals that provide critical habitat	Continued maintenance, monitoring, and surveying of burrowing mammals and their colonies
Habitat loss and fragmentation due to agricultural and urban development	Conservation easements and other conservation practices that recover or protect native prairie grassland areas
Petroleum exploration and development	Research the impacts such as road building and water retention pond construction as they relate gas and oil development activities
Residual effects of pesticide use	Continue monitoring residual levels of contaminants
Nest site disturbance	Increased education and information to increase awareness of importance of nesting sites and reducing disturbance

Management Plans

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Black-backed Woodpecker (*Picoides arcticus*)

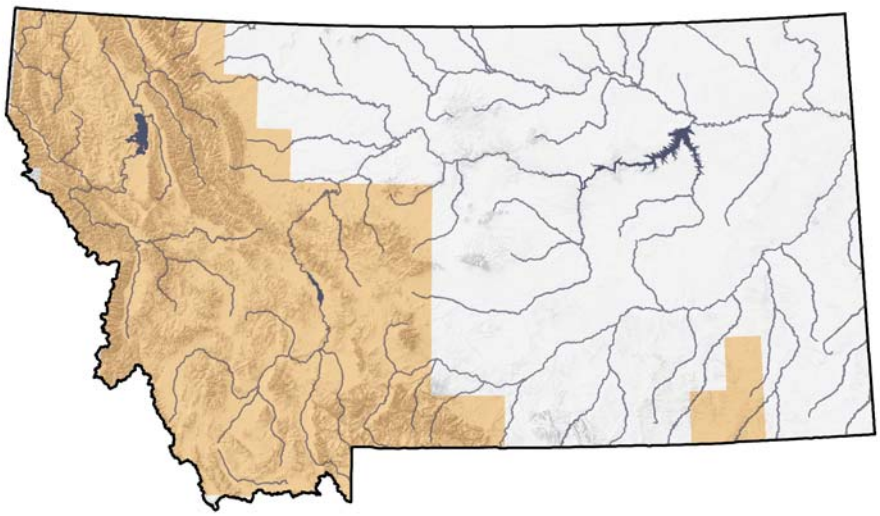

Figure 84. Distribution of the Black-backed Woodpecker
(Distribution reflects entire range and does not discriminate between breeding and non-breeding areas)

Range

The range of the black-backed woodpecker in Montana is primarily confined to the western portion of the state. The Montana Bird Distribution (2003) and the Montana Natural Heritage Program (2003) have approximately 16 confirmed breeding records for the species. Except for a single record from the south-central area of the state (southern Park County), all the breeding records are located in northwestern counties (Lincoln, Sanders, Flathead, Missoula, Lewis and Clark, and Powell) (MBD 2003). Unconfirmed but potential breeding records also exist for black-backed woodpeckers and would expand their range to most counties in the western part of the state, including areas in southwestern Montana, the Big and Little Belt mountains area, and the Bridger Range (MBD 2003). Several unconfirmed breeding records also exist for a small area in southeast Montana (Custer National Forest) (MBD 2003).

The black-backed woodpecker breeds from central Alaska and northern Canada south to the mountainous regions of California, Wyoming, the Black Hills, the upper Great Lakes, the New England states, and into Newfoundland. Like most woodpeckers, they feed on insects living in dead or diseased trees and hunt for wood-boring insects by peeling away patches of dead bark.

Habitat

The habitat of black-backed woodpeckers in Montana is early successional burned forest of mixed conifer, lodgepole pine, Douglas-fir, and spruce-fir (Hutto

1995a, 1995b), although they are more numerous in lower elevation Douglas-fir and pine forest habitats than in higher elevation subalpine spruce forest habitats (Bock and Bock 1974). This is supported by Harris (1982), who found black-backed woodpeckers in two recently burned forests composed of 73 percent and 77 percent Douglas-fir, respectively. They appear to concentrate in recently burned forests and remain for several years (three to five) before leaving due to prey source decline (Harris 1982). In northwestern Montana, black-backed woodpeckers nested in areas of western larch (*Larix occidentalis*)/Douglas-fir forest with a major component of old growth (McClelland et al. 1979). Harris (1982) found black-backed woodpeckers nesting within western larch even though the stand was predominately Douglas-fir. McClelland et al. (1979) determined that the decay of heartwood within a hard outer shell of western larch creates an ideal nesting site for black-backed woodpeckers to excavate.

The black-backed woodpecker is thought to be sedentary during the winter months. Black-backed nests have been monitored in Idaho (burned ponderosa pine forests), Wyoming (burned lodgepole pine forests), Oregon (unburned mixed-pine forest with bark-beetle outbreaks), and Montana (patchily burned mixed-conifer forests) (Dixon and Saab 2000). Bent (1939) found that more than 75 percent of the black-backed woodpecker's diet was composed of cerambycids (flatheaded wood borers) and buprestids (round-headed woodborers). It is believed the black-backed is able to more effectively extract wood-boring insect larva than other woodpeckers (Kirby 1980).

The value in long-term observations is evident in understanding wildlife habitat relationships (Sergio and Newton 2003). Information from the Montana Heritage Program (through May 2003) and the Idaho Data Conservation Center (through January 2003) show most black-backed woodpecker nests (n = 14) in Idaho are near (within 1,000 meters) or within insect outbreaks. In Montana, nest site information is lacking, but most observations are in or near insect outbreaks or recently burned areas. More detailed information of black-backed nest sites, foraging, and general behavior and ecology in the breeding season is found in recently published reviews (Dixon and Saab 2000) and peer-reviewed literature (McIver and Starr 2001; Hoyt and Hannon 2002).

Management

No known active management is ongoing for black-backed woodpeckers in the state. Studies by the U.S. Forest Service in the Rocky Mountains with locations in Montana has been underway in the last few years to provide more information about black-backed woodpecker habitat needs and ecology.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Increased timber harvest	Work with agencies and companies that work in forest management to promote conservation practices
Fire suppression	Decrease fire suppression to allow natural occurrences in isolated areas
Removal of fire-killed or insect-infested trees	Manage “salvage” logging techniques in order to provide sufficient snags
	Leave parts of fire areas unsalvaged, in blocks as large as practicable
Conversion of mature and old-growth forests to young stands with few decayed trees	Ensure that fire, insects, and wind are allowed to regularly disturb habitat throughout space and time
Human disturbance near nest sites	Avoid human-related factors that may impact behavior

Management Plan

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Olive-Sided Flycatcher (*Contopus cooperi*)

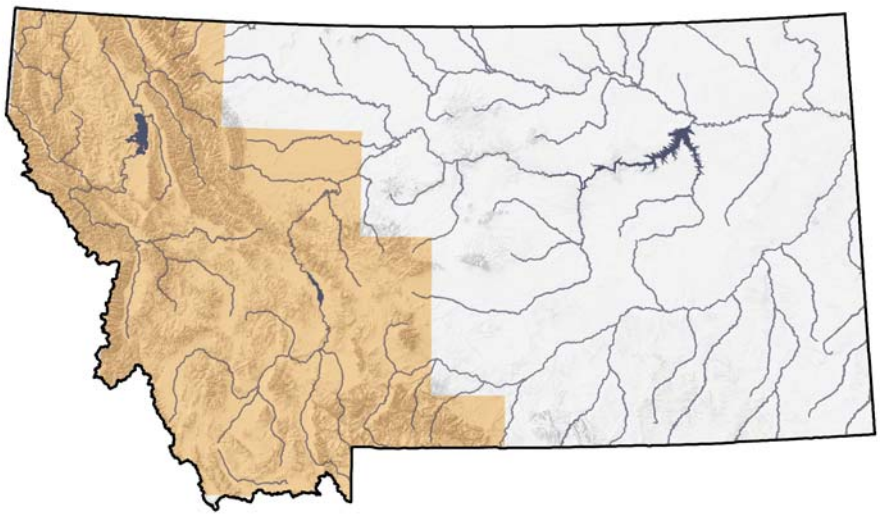

Figure 85. Distribution of the Olive-Sided Flycatcher
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The olive-sided flycatcher breeds throughout mountainous areas of the western portion of the state with unconfirmed reports of breeding in the central region of Montana (Casey 2000; Montana Bird Distribution 2003). The species; propensity for higher elevations, usually from 920 to 2,130 meters, explains the transient nature of individuals reported at locations north and east of Billings (Montana Bird Distribution 2003).

Habitat

A species that generally breeds in the montane and boreal forests in the mountains of western North America, olive-sided flycatchers are highly adapted to the dynamics of a landscape frequently altered by fire. They are more often associated with post-fire habitat than any other major habitat type, but may also be found in other forest openings (clear-cuts and other disturbed forested habitat), open forests with a low percentage of canopy cover, and forest edges near natural meadows, wetlands, or canyons (Hutto and Young 1999; Altman and Sallabanks 2000). Their affinity for forested edges near water may be because of a higher presence of flying insects in these areas (Altman and Sallabanks 2000). The species forages on flying insects aerially from high, exposed perches atop tall trees or snags. They are a species common in spruce and aspen (*Populus tremuloides*), but uncommon in mixed-conifer, ponderosa pine (*Pinus ponderosa*), pine-oak (*Pinus-Quercus*), and cedar-hemlock

(*Cupressaceae-Tsuga*) forests and rarely present in lodgepole pine (*Pinus contorta*) or pinyon-juniper (Hejl et. al. 1995, as cited in Casey 2000).

The olive-sided flycatcher is a contrast species, which used a mosaic of coniferous old forests for nesting and either openings or gaps in old forests for foraging (Altman and Sallabanks 2000). Current habitat conditions are likely inferior in quantity and quality to historical conditions because of changes in historical fire regimes, but the magnitude of the change is unknown (Wisdom et al. 2000). The species is the only common species detected more often at forest edges than in forest interiors.

Management

Management actions in Montana are currently limited by lack of conclusive information about the specific relationship between the species' habitat use and reproductive success. It is yet to be determined if stand-replacing fire regimes or fires of less magnitude provide more appropriate habitat for successful reproduction (Casey 2000). The olive-sided flycatcher is a Species of Management Concern in USFWS Region 6 (U.S. Fish and Wildlife Service 1995).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Fire suppression management	Use prescribed fire, timber harvest, and thinning to change forest composition and structure to restore old open forest conditions
	Identify occupied habitat and evaluate the quality and quantity of unoccupied habitat or habitat that would be suitable with restoration with fire or other action
Decreased post-fire snags and large trees	Selective logging practices
	Retain, maintain, and/or restore stands of open-canopy mature and older ponderosa pine and cottonwood and actively manage to promote long-term sustainability
Conversion of forest to urban and residential areas	Retention of forested edge habitat around riparian and wetland features

Management Plans

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Sedge Wren (*Cistothorus plantensis*)

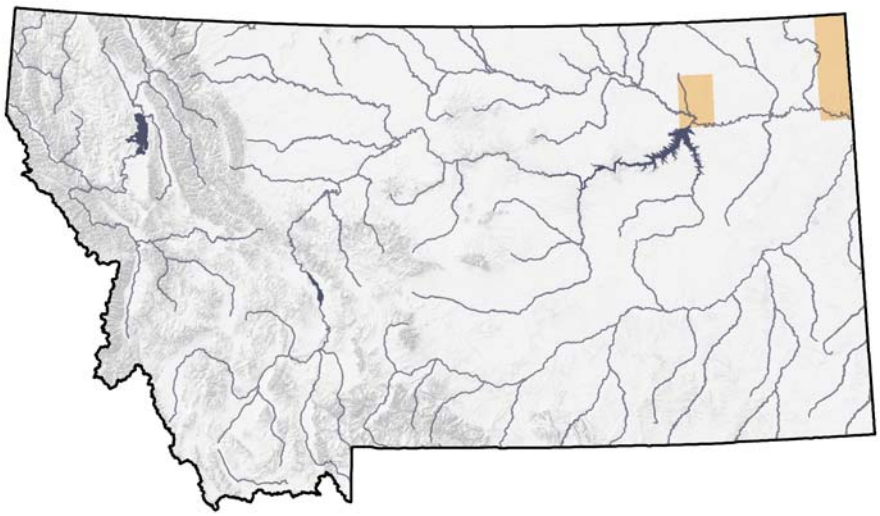

Figure 86. Distribution of the Sedge Wren
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The migratory pattern of this species in Montana is poorly known, and few records exist for the state. The earliest recorded date for the sedge wren in Montana occurred in April 1909 in Gallatin County. Two recent records for Westby and Fort Peck indicate the presence of individuals in May (Montana Bird Distribution 2003).

Habitat

No specific information exists, but appropriate wetland habitat is present in the areas of the state in which the species has been recorded.

Management

No known active management is ongoing for sedge wren in the state. Sedge wrens are a Species of Management Concern in USFWS Region 6 (U.S. Fish and Wildlife Service 1995).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Lack of information	Determine breeding status and identify breeding locations

	Increased survey, inventory, and monitoring projects
Human-directed disturbance to wetland habitats (e.g., disturbance can/does include impacts of cattle grazing, draining, vegetation manipulation, invasion of non-native plant and animal species, etc.)	Appropriate conservation management of wetland habitats of known use by sedge wrens

Management Plan

Casey, D. 2000. Partners in Flight Bird Conservation Plan Montana Version 1.0. Montana Partners in Flight. Kalispell, MT.

Citations

Montana Bird Distribution Online Database. 2001. Helena, MT. April–September 2003. http://MNHP.nris.state.mt.us/mbd/.

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Nelson's Sharp-tailed Sparrow (*Ammodramus nelsoni*)

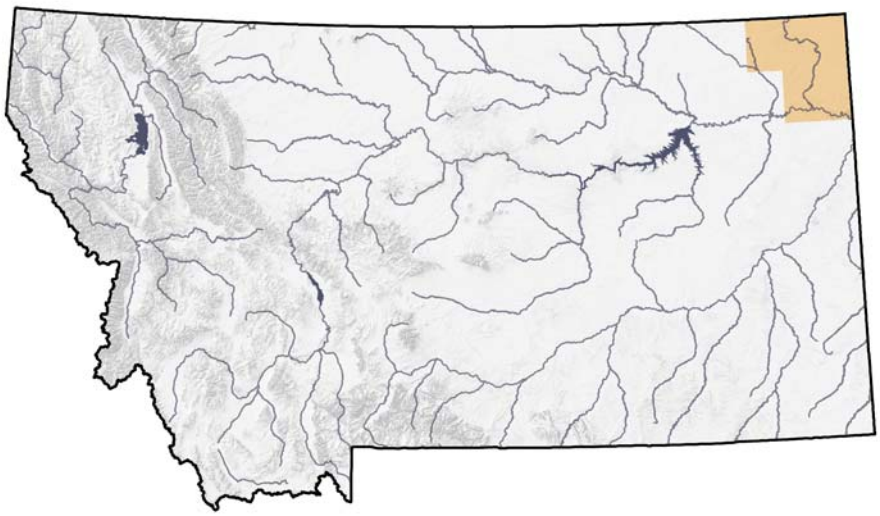

Figure 87. Distribution of the Nelson's Sharp-tailed Sparrow
(Distribution reflects entire range and does not discriminate between breeding and nonbreeding areas)

Range

The Nelson's sharp-tailed sparrow has an extremely limited range in Montana. The species has only been observed in eastern Sheridan and northeastern Roosevelt counties. About a dozen observations for this species have been made, and only a single breeding occurrence has been documented (Montana Bird Distribution 2003; MNHP 2003).

Habitat

There is very little information about the habitat for this species in Montana; however, it is assumed that the habitat is similar to that used in other portions of the species' range. This species prefers freshwater wetlands with dense, emergent vegetation or damp areas with dense grasses (Bownan 1904; Murray 1969; Stewart 1975; Krapu and Green 1978; Knapton 1979; Williams and Zimmer 1992; Berkey et al. 1993). In North Dakota, Nelson's sharp-tailed sparrows were common in prairie cordgrass (*Spartina pectinata*) stands, occurred at the edges of common reed (*Phragmites australis*) stands, and nested in sprangletop (Murray 1969). In northeastern North Dakota, they nested in thin, sparse grass on a wet alkali flat (Rolfe 1899; Hill 1968).

Nests usually are found in stands of grasses with litter that is persistent from year to year (Greenlaw 1993) and are built on or slightly above the ground in damp areas among emergent vegetation (Murray 1969; Stewart 1975). In North Dakota, Nelson's sharp-tailed sparrows are more abundant in dry years than in

wet years (Stewart 1975). In dry years, they nest in the shallow-marsh and deep-marsh zones of wetlands. In wet years, they nest in cordgrass (*Spartina* spp.) within wet-meadow zones.

Management

No known active management is ongoing for Nelson's sharp-tailed sparrows in the state. Conservation Reserve Program practices may provide large blocks of suitable habitat for this species in northeastern Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Not adequately monitored or understood	Increased monitoring and survey efforts, especially breeding sites
Due to small occupied area, risk of extirpation from the state is high	Protection of areas where species is found
Wetland destruction	Wetland restoration and protection
	Increased management of grazing regimes that promote healthy habitat
Parasitism by brown-headed cowbird	Support research to better understand natural relationship between host and parasite

Management Plans

Casey, D. 2000. Partners in Flight Bird Conservation Plan Montana Version 1.0. Montana Partners in Flight. Kalispell, MT.

Rich, T. D., C. J. Beardmore, H. Berlanga, P. J. Blancher, M. S. W. Bradstreet, G. S. Butcher, D. W. Demarest, E. H. Dunn, W. C. Hunter, E. E. Inigo-Elias, J. A. Kennedy, A. M. Martell, A. O. Panjabi, D. N. Pashley, K. V. Rosenberg, C. M. Rustay, J. S. Wendt, and T. C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, NY.

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Mammals

Spotted Bat (*Euderma maculatum*)

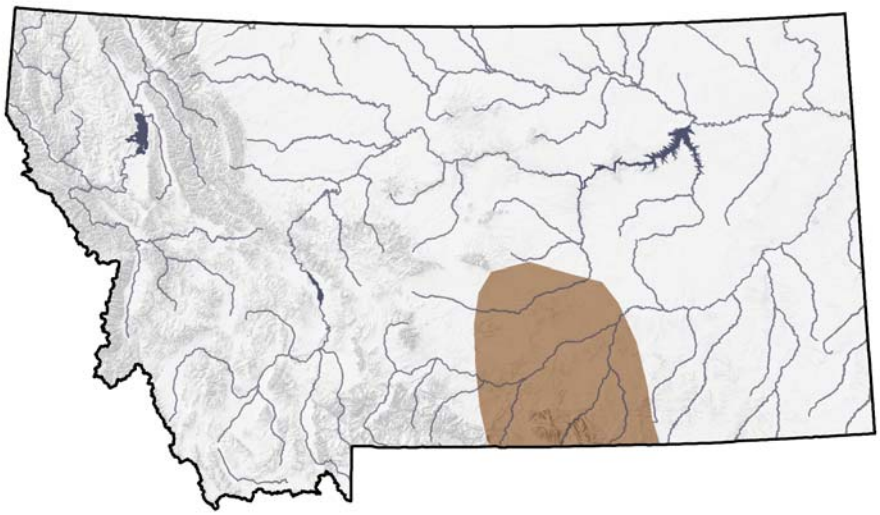

Figure 88. Distribution of the Spotted Bat

Range

The full extent of the spotted bat's range in Montana is unknown due to limited survey efforts and less than two dozen reported encounters (mostly from Carbon County). Spotted bats appear to be restricted to areas east of the Continental Divide in south-central Montana. Voucher specimens exist for Carbon and Yellowstone counties, and there are reports from Big Horn and Powder River counties, all dating from 1949 to 1990 (Nicholson 1950; Fenton et al. 1987; Worthington 1991a, 1991b; Foresman 2001). There also are recent observations from additional localities in Carbon County (Hendricks and Carlson 2001). Recently, they have been heard along the Missouri River at several locations in the Wild and Scenic section (DuBois personal communication 2005). Spotted bats in Montana have been encountered at elevations ranging from 3,124 to 7,800 feet (952 to 2,377 meters).

Habitat

Spotted bats often have been encountered or detected in open, arid habitats in close proximity to tall cliffs. Outside Montana, these areas are sometimes dominated by Utah juniper (*Juniperus osteosperma*) and sagebrush (*Artemisia tridentata* and *A. nova*), sometimes intermixed with limber pine or Douglas-fir, or in grassy meadows in ponderosa pine savannah (Fenton et al. 1987; Worthington 1991b; Hendricks and Carlson 2001). In Montana, these areas are sometimes dominated by Rocky Mountain juniper (*juniperus scopulorum*). Cliffs, rocky outcrops, and water are other attributes of sites where spotted bats have

been found (Foresman 2001), which are typical for the global range. A spotted bat was captured foraging over an isolated pond within a few kilometers of huge limestone escarpments in the Big Horn Canyon National Recreation Area, Carbon County (Worthington 1991a, 1991b), and the first record for the state was of an individual that flew in an open window at a private residence in Billings, Yellowstone County (Nicholson 1950). Spotted bats are now known to be fairly widespread but quite sparse in population, adding to the difficulty of detection (DuBois personal communication 2005). Factors that limit their distribution are not understood, and roost habitats and sites have not been documented in Montana. In other areas, spotted bats have been detected at water sources and in meadow openings, often with large cliffs nearby (Leonard and Fenton 1983; Storz 1995; Perry et al. 1997; Rabe et al. 1998; Gitzen et al. 2001).

Spotted bats roost in caves and in cracks and crevices in the cliffs and canyons with which this species is consistently associated; it can crawl with ease on both horizontal and vertical surfaces (Snow 1974; Van Zyll de Jong 1985). In British Columbia, individuals used the same roost each night during May through July, but not after early August (Wai-Ping and Fenton 1989). Winter habitat is poorly documented. A possible explanation for the early paucity of collections in natural situations is the bat's narrow habitat tolerance (Handley 1959; Snow 1974).

Management

Spotted bats have persisted for more than 50 years in the general area of the state where they were first discovered (Nicholson 1950; Hendricks and Carlson 2001). This is encouraging given that essentially nothing is known in Montana of spotted bat abundance, reproductive biology, habitat requirements, movements, and roost site selection. Their audible calls make a survey much easier to conduct (Pierson and Rainey 1998), because no special skill is needed other than familiarity with the calls and knowledge of the habitats likely to support spotted bats.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Riparian degradation that could affect sustainable prey (moths) populations	Complete the Montana Bat Management Plan (in progress)
Open waste sumps and similar hazardous standing water bodies associated with oil and gas fields	Protection of water sources in arid regions
Lack of information due to difficulty of surveying	Increase monitoring and surveys
Recreational climbing disturbs roost sites	Protect roost sites

Use of pesticides that bats may accumulate through their diet and that kill their prey	Support and cooperate in studies to determine more about the impacts of humans

Management Plans

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Townsend's Big-eared Bat (*Corynorhinus townsendii*)

Figure 89. Distribution of the Townsend's Big-eared Bat

Range

The complete extent of the range of the Townsend's big-eared bat in Montana is unknown, due to the limited survey effort across many areas. It has been documented in more than 20 counties (voucher specimens from 14) and on both sides of the Continental Divide, from the Idaho state line in the west to the North Dakota and South Dakota state lines in the east, and from the Wyoming state line in the south to the Canadian border at Alberta in the northwest (Hoffmann et al. 1969; Swenson and Shanks 1979; Hendricks et al. 1996; Hendricks and Kampwerth 2001; Foresman 2001), at elevations of 1,968 to 7,820 feet (600 to 2,384 meters). The only known location north of the Missouri River in northeastern Montana is in the Little Rocky Mountains (Hendricks et al. 2000); the species has not yet been reported in Alberta or Saskatchewan.

Habitat

Habitat use in Montana has not been evaluated in detail, but it seems to be similar to other localities in the western United States. Caves and abandoned mines are used for maternity roosts and hibernacula (Worthington 1991; Hendricks et al. 1996; Hendricks 2000; Hendricks et al. 2000; Foresman 2001; Hendricks and Kampwerth 2001); use of buildings in late summer also has been reported (Swenson and Shanks 1979). Habitats in the vicinity of roosts include Douglas-fir and lodgepole pine forests, ponderosa pine woodlands, Utah juniper-sagebrush scrub, and cottonwood bottomlands. In hibernacula, ambient temperatures ranged from minus 1 to 8 degrees F (30 to 46 degrees F when torpid Townsend's big-eared bats were present) (Hendricks and Kampwerth 2001). Temperatures at maternity roosts are poorly documented; the temperature

was 54 degrees F in mid-July near a colony in an abandoned mine in Lake County and 66 degrees F in August near a colony in a large and relatively open cave chamber in Lewis and Clark County. Many caves and mines in Montana remain cool in summer, with the potential of being too cool to be used as maternity roosts. Townsend's big-eared bats feed on many different flying insects and may be a moth specialist.

Management

The response by Townsend's big-eared bats to human activities is largely undocumented in Montana. The maternity colony at Lewis and Clark Caverns has persisted for more than a century but has decreased in recent years (no bats returned in 2005). In eastern Montana numerous abandoned coal mines, several of which were used as hibernacula, have been completely closed in recent decades; these mines are no longer accessible to bats. Abandoned mine reclamation has also been underway in western Montana during the same time. During the last decade, mine surveys prior to closure have been undertaken by land management agencies to determine the potential of abandoned mines as bat habitat. In some cases bat-friendly gates were installed at known Townsend's big-eared bat roosts, and the roosts have continued to be used after gate installation (Hendricks 1999; Hendricks and Kampwerth 2001). Some caves in the Pryor Mountains and Little Rocky Mountains with documented use by Townsend's big-eared bat are protected with bat-friendly gates (Worthington 1991; Hendricks et al. 2000). Surveys should follow protocols in the conservation assessment and conservation strategy (Pierson et al. 1999). All observations of Townsend's big-eared bat roosts should be reported to the appropriate land management agency, the Montana Natural Heritage Program, or the Montana Department of Fish, Wildlife & Parks.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Vandalism to maternity colonies and hibernacula	Identification of maternity colonies and hibernacula and closures to recreationists to these areas
	Reduce levels of human activities around known bat roosts through road management, signs, and public education
	Continue surveying caves and mines for maternity colonies and hibernacula
Abandoned mine closures	Install bat-friendly gates on coal mines instead of closure
	Recruit and educate recreational caving groups to assist with management of caves

Toxic material impoundments	Ensure utilization of nontoxic materials and nontoxic byproducts during mining activities
Degradation and loss of native riparian vegetation	Complete the Montana Bat Management Plan (in progress)
	Maintain and improve the condition of riparian vegetation for bat foraging areas

Management Plans

Altenbach, J. S., W. Amy, P. V. Bradley, P. E. Brown, K. Dewberry, D. B. Hall, J. Jeffers, B. Lund, J. E. Newmark, M. J. O'Farrell, M. Rahn, R. E. Sherwin, C. R. Tomlinson, and J. A. Williams. 2002. Nevada Bat Conservation Plan. Nevada Bat Working Group. Austin, NV. 188 pp.

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Pallid Bat (*Antrozous pallidus*)

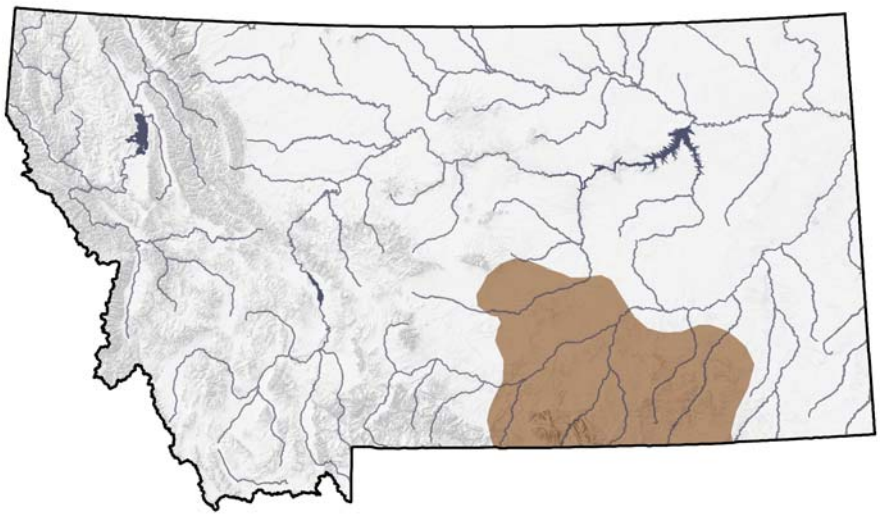

Figure 90. Distribution of the Pallid Bat

Range

The known distribution of the pallid bat in the state is not yet well defined, but Montana is at the northeastern edge of its global range. Several have been captured east of the Continental Divide in south-central Montana at Layout Creek and Gyp Spring in southern Carbon County (Shryer and Flath 1980; Worthington 1991; P. Hendricks and J. Carlson, personal observation) and west of Colstrip in Rosebud County. Montana records are from elevations between 3,800 and 4,600 feet (1,158 to 1,402 meters).

Habitat

Habitat at the Carbon County sites is Utah juniper-black sagebrush (*Juniperus osteosperma-Artemisia nova*). The Rosebud County site is in an area of ponderosa pine (*Pinus ponderosa*) savannah and big sagebrush (*Artemisia tridentata*). Both areas have rock outcrops (limestone or sandstone) in the immediate vicinity or within a short flying distance. This species has not yet been detected at rock crevices, caves, or abandoned mines in Montana; most observations have been at water sources (spring-fed streams or ponds, e.g., Carbon County) (Shryer 1980). However, habitat use in Montana by this species remains poorly known and unstudied.

At other locations, pallid bats have been found in arid deserts, juniper woodlands, sagebrush shrub-steppes, and grasslands, often with rocky outcrops and water nearby. They are less abundant in evergreen and mixed-conifer woodlands, but have been found in ponderosa pine forests near cliffs (Nagorsen and Brigham 1993). They typically roost in rock crevices or buildings and less often in caves,

tree hollows, under bridges, and in abandoned mines (Hermanson and O'Shea 1983; Verts and Carraway 1998). In Oklahoma, night roosts often are in caves (Caire et al. 1989). Four summer roosts in Wyoming were in rock shelters (1), caves (2), and mines (1) (Priday and Luce 1997). Day and night roosts are usually distinct. In Oregon, night roosts were in buildings, under rock overhangs, and under bridges; bats generally were faithful to particular night roosts both within and between years (Lewis 1994). Night roosts in British Columbia were often in cavities in ponderosa pines (Nagorsen and Brigham 1993). Day roosts include rock piles, tree hollows, and rock crevices. Pallid bats found in caves or mines usually use crevices within these places (Hermanson and O'Shea 1983; Caire et al. 1989). Maternity colonies are often located in horizontal crevices in rock outcrops and man-made structures, where temperatures are a fairly constant 30 degrees F. Pallid bats forage on or near the ground and consume invertebrates such as scorpions, centipedes, crickets, grasshoppers, and beetles.

Management

Pallid bats have persisted for more than 20 years in the general area of the state where they were first discovered (Shryer and Flath 1980; Worthington 1991; P. Hendricks and J. Carlson, personal observation). This is encouraging given that essentially nothing is known in Montana of the pallid bat's abundance, reproductive biology, habitat requirements, movements, and roost site selection, nor have the potential threats to this bat been identified.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Little information of distribution, population, and requirements	Complete the Montana Bat Management Plan (in progress)
	Increased survey and monitoring techniques
Oil and gas fields disturbance of water sources	Protection of water sources in arid regions
Roost disturbance	Protection of roost sites
Recreational caving	Educate recreationists on the threats to bats
Closure of mines for reclamation	Work to install new entrance barriers that allow free passage of bats
Use of pesticides that bats may accumulate through their diet and that kill their prey	Support and cooperate in studies to determine more about the impacts of humans

Management Plans

Altenbach, J. S., W. Amy, P. V. Bradley, P. E. Brown, K. Dewberry, D. B. Hall, J. Jeffers, B. Lund, J. E. Newmark, M. J. O'Farrell, M. Rahn, R. E. Sherwin, C. R. Tomlinson, J. A. Williams. 2002. Nevada Bat Conservation Plan. Nevada Bat Working Group. Austin, NV. 188 pp.

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Pygmy Rabbit (*Brachylagus idahoensis*)

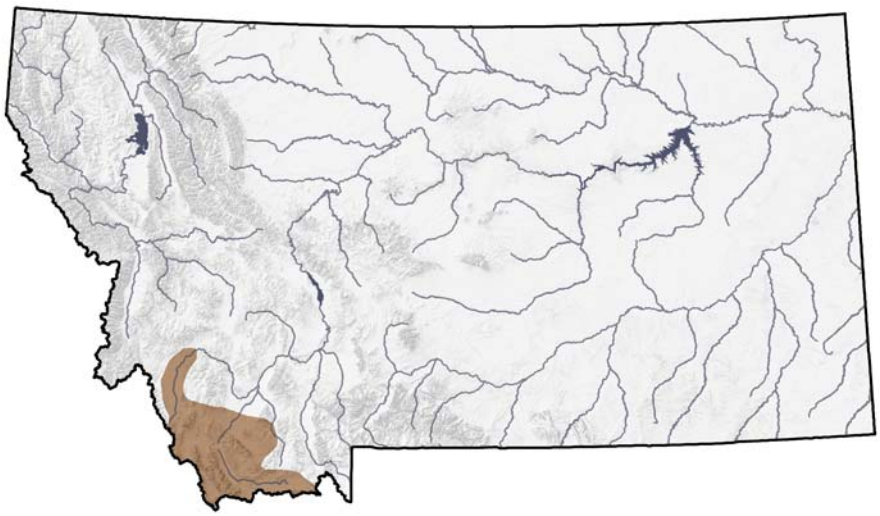

Figure 91. Distribution of the Pygmy Rabbit

Range

Montana lies on the northeastern edge of pygmy rabbit distribution. There are confirmed records dating back to 1918 from three southwestern counties (Beaverhead, Jefferson, and Madison), with most of the Montana range in Beaverhead County (Davis 1937; Hoffmann et al. 1969; Rauscher 1997; Foresman 2001a); a 1937 specimen reported from near Lake Como in Ravalli County needs verification. Rauscher (1977) documented occupation in the southern portion of Silver Bow County. Records are from elevations between 4,500 and 6,700 feet (1,372 to 2,042 meters).

Habitat

Occupied habitats in Montana include shrub grasslands on alluvial fans, floodplains, plateaus, high mountain valleys, and mountain slopes where suitable sagebrush cover and soils for burrowing are available. Some occupied sites may support a relatively sparse cover of sagebrush and shallow soils but usually support patches of dense sagebrush and deeper soils. Big sagebrush was the dominant shrub at all occupied sites, averaging 21.3 to 22.6 percent coverage; bare ground averaged 33 percent and forbs 5.8 percent. Average height of sagebrush in occupied sites was 0.4 meter (Rauscher 1997). In southwestern Wyoming, pygmy rabbits selectively used dense and structurally diverse stands of sagebrush that accumulated a relatively large amount of snow; the subnivean environment provided access to a relatively constant supply of food and protection from predators and thermal extremes (Katzner and Parker 1997).

Pygmy rabbits dig burrows extending to a depth of 1 meter, and they form

chambers as part of the burrow system. Burrows have been excavated, but no nests have been found and the location of nests is not known (Green and Flinders 1980a). A recent increase in surveying by the Montana Natural Heritage Program has identified more observations of individuals, burrow locations, and habitat preferences.

Management

No special management activities have been developed or implemented in Montana specifically for pygmy rabbits. However, conservation habitat management to preserve sagebrush habitat for other species, e.g., sage grouse, will likely benefit pygmy rabbits. Removal of sagebrush will make the landscape unsuitable for pygmy rabbits. This species is found where grazing occurs and will continue to survive as long as sagebrush cover is maintained. Dense stands of sagebrush along streams, fence lines, and borrow ditches are probably essential avenues for dispersal of pygmy rabbits.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Loss of sagebrush habitat due to range management practices	Consider preparing a management plan for the pygmy rabbit or include it into other comprehensive taxonomic plans
	Livestock rest and rotation on lands
Fragmentation of available habitat	Coordination efforts with federal agencies including BLM and USFS
	Continue surveying for new populations and monitoring of existing ones
Habitat specialist on all scales	Sagebrush protection on a large scale

Management Plan

None

Citations

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Hoary Marmot (*Marmota caligata*)

Figure 92. Distribution of the Hoary Marmot

Range

Although the distribution map provided above indicates that haory marmots occur throughout western Montana, they most likely only occupy 5 to 10 percent of the area depicted. They do not occur in the Salish Mountains and occur only in small pockets in the Whitefish Range. They are generally confined to high subalpine and alpine habitats and may move through coniferous forests in northwest Montana. There are small, scattered, isolated populations south of the Mission Mountains (Foresman 2001).

Habitat

The hoary marmot is found primarily in rocky outcroppings and large boulder fields in high subalpine and alpine regions of Montana where they feed, burrow, and raise young.

Management

There are no management strategies for this species in Montana at this time.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Lack of data on status and size of Montana's populations	Prepare conservation plan, addressing conservation concerns and establishing a monitoring protocol

	Conduct inventory to obtain estimates of population status and size and habitat needs and distribution, mountain range by mountain range
Little or no connectivity between populations in distinct mountain ranges	Determine the effects of inbreeding in isolated populations and examine feasibility of transplanting individuals between populations in an effort to increase genetic diversity
	Conserve small populations found on the periphery of their distribution, including scattered populations in the high mountains of the Mission and Swan mountains
Change in climate due to global warming	Conduct monitoring program to establish long-term trends of abundance and distribution of populations

Management Plan

None

Citations

Foresman, K. R. 2001. The wild mammals of Montana. Special Publication No. 12. American Society of Mammalogists.

Black-tailed Prairie Dog (*Cynomys ludovicianus*)

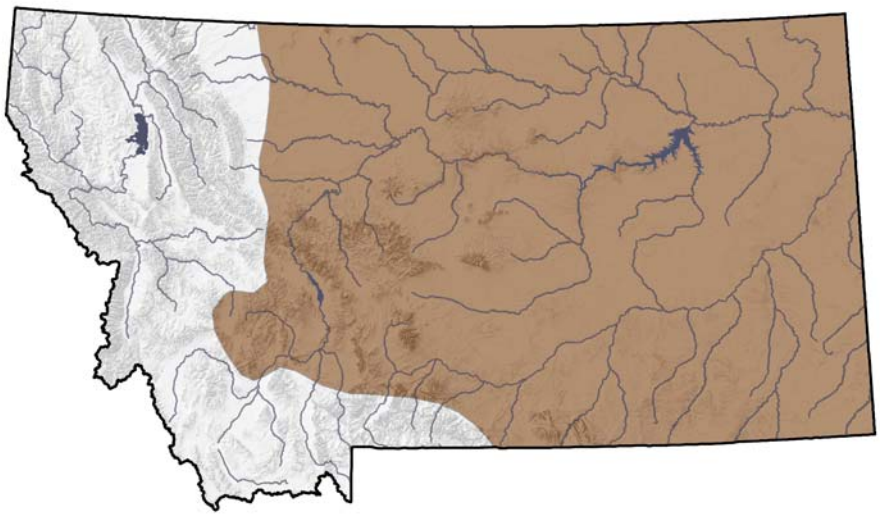

Figure 93. Distribution of the Black-tailed Prairie Dog

Range

Black-tailed prairie dogs are found across eastern Montana except in the northeastern corner and the Clarks Fork of the Yellowstone drainage (Campbell 1989).

Habitat

Prairie dog colonies are found on flat, open grasslands and shrub grasslands with low, relatively sparse vegetation. The most frequently occupied habitat in Montana is dominated by western wheatgrass, blue grama, and big sagebrush (Montana Fish, Wildlife & Parks 2002). Colonies are associated with silty clay loams, sandy clay loams, and loams (Thorp 1949; Bonham and Lerwick 1976; Klatt and Hein 1978; Agnew et al. 1986), and fine- to medium-textured soils are preferred (Merriam 1902; Thorp 1949; Koford 1958) presumably because burrows and other structures tend to retain their shape and strength better than in coarse, loose soils. Encroachment into sandy soil (e.g., loamy fine sand) does occur if the habitat is needed for colony expansion (Osborn 1942).

Shallow slopes of less than 10 percent are preferred (Koford 1958; Hillman et al. 1979; Dalsted et al. 1981) presumably in part because such areas drain well and are only slightly prone to flooding. By colonizing areas with low vegetative stature, prairie dogs often select areas with past human (as well as animal) disturbance, including areas heavily used by cattle such as near water tanks and at long-term supplemental feeding sites (Licht and Sanchez 1993; FaunaWest 1998).

Management

In Montana, the black-tailed prairie dog has been designated a nongame wildlife species in need of management. Shooting of prairie dogs on public lands (excluding state school trust lands) is regulated. Contact Montana Fish, Wildlife & Parks for the latest regulations. Prairie dogs are managed under the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (Montana Prairie Dog Working Group 2002). Please consult this plan for details concerning prairie dog management in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Conversion of native rangelands to agriculture and, to a lesser degree, residential development	Institute a landowner incentive program and a prairie dog control program designed to manage prairie dog acreage, rather than eradicate prairie dogs
Conflicts between the present abundance of prairie dogs and other land uses	Develop regional prairie dog distribution and abundance goals
	Identify and support or conduct research projects designed to form solutions to short-term and long-term biological and social problems related to black-tailed prairie dog communities and their management
	Identify isolated prairie dog colonies and apply management measures necessary to maintain current distribution
Disease, particularly sylvatic plague (Yersinia pestis)	Continue prairie dog inventory and monitoring efforts
	Assist in funding research projects targeting effects of disease on prairie ecosystems, particularly sylvatic plague (Yersinia pestis)
Poisoning as a governmental control program	Develop and implement a prairie dog ecosystem education program

Management Plans

Bureau of Land Management (BLM). 1979. Habitat management plan for prairie dog ecotypes. USDI, BLM, Montana State Office. Wildlife Habitat Area MT-02-06-07-S1. 61 pp.

Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (Montana Prairie Dog Working Group 2002).

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White-tailed Prairie Dog (*Cynomys leucurus*)

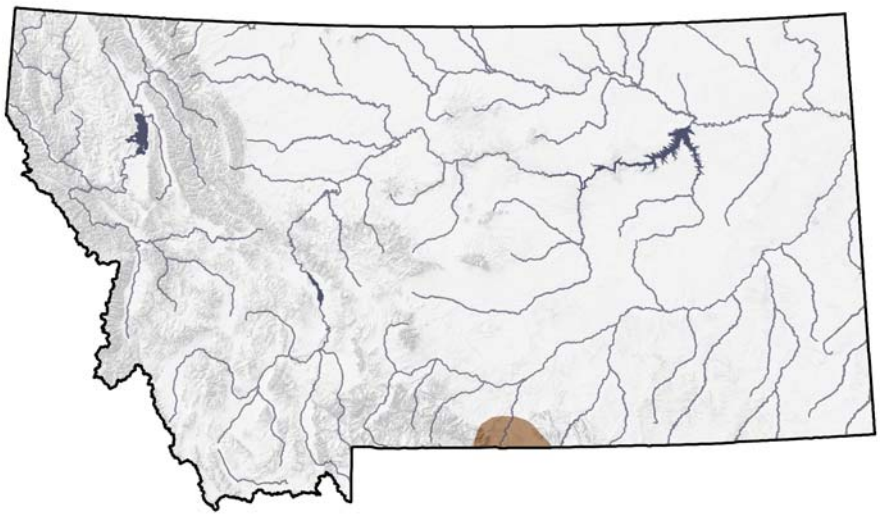

Figure 94. Distribution of the White-tailed Prairie Dog

Range

In Montana, white-tailed prairie dogs now only inhabit a small area in the south-central portion of state, near the Pryor Mountains.

Habitat

Throughout their range, white-tailed prairie dogs inhabit xeric sites with mixed stands of shrubs and grasses. In Montana they inhabit sites dominated by Nuttall saltbrush with lesser amounts of big sage and areas with povery sumpweed (Flath 1979). They live at higher elevations and in meadows with more diverse grass and herb cover than do black-tailed prairie dogs (Hoffmann, in Wilson and Ruff 1999), and their range in Montana is at higher elevations than other sites within their distribution.

Management

White-tailed prairie dogs are designated as a nongame wildlife species in need of management in Montana. Public lands (excluding state school trust lands) in the portion of Carbon County occupied by white-tailed prairie dogs has been closed to sport shooting on a year-round basis. Contact Montana Fish, Wildlife & Parks for the most current regulations concerning prairie dogs. White-tailed prairie dogs are managed under the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (Montana Prairie Dog Working Group 2002). Please consult this plan for details concerning prairie dog management in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Conversion of native rangelands to agriculture, and, to a lesser degree, residential development	Institute a landowner incentive program and a prairie dog control program designed to manage prairie dog acreage, rather than eradicate prairie dogs
Disease, particularly sylvatic plague (Yersima pestis)	Assist in funding research projects targeting effects of disease on prairie ecosystems, particularly sylvatic plague (Yersinia pestis)
Vulnerability of remaining small and isolated colonies to extirpation, which could result in contraction in the current range of this species	Translocate white-tailed prairie dogs from a colony in the path of a highway upgrade project to a formerly occupied site on BLM land
	Reintroduce white-tailed prairie dogs to sites that were formerly occupied until the early 1990s

Management Plans

Bureau of Land Management (BLM). 1979. Habitat management plan for prairie dog ecotypes. USDI, BLM, Montana State Office. Wildlife Habitat Area MT-02-06-07-S1. 61 pp.

Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana. Montana Prairie Dog Working Group 2002.

Citations

An Inventory of Black-tailed and White-tailed Prairie Dog Colonies in the Billings and Powder River Areas. 2004.

Flath, D. L. 1979. Status of the white-tailed prairie dog in Montana. Proceedings of the Montana Academy of Sciences 38:63–67.

Knowles, C. J. 2002. Status of the white-tailed and Gunnison's prairie dog. Environmental Defense and National Wildlife Federation. FaunaWest Wildlife Consultants. Boulder, MT.

Wilson, D. E., and S. Ruff. 1999. The Smithsonian book of North American mammals. Smithsonian Institution, Washington, DC. 750 pp.

Great Basin Pocket Mouse (*Perognathus parvus*)

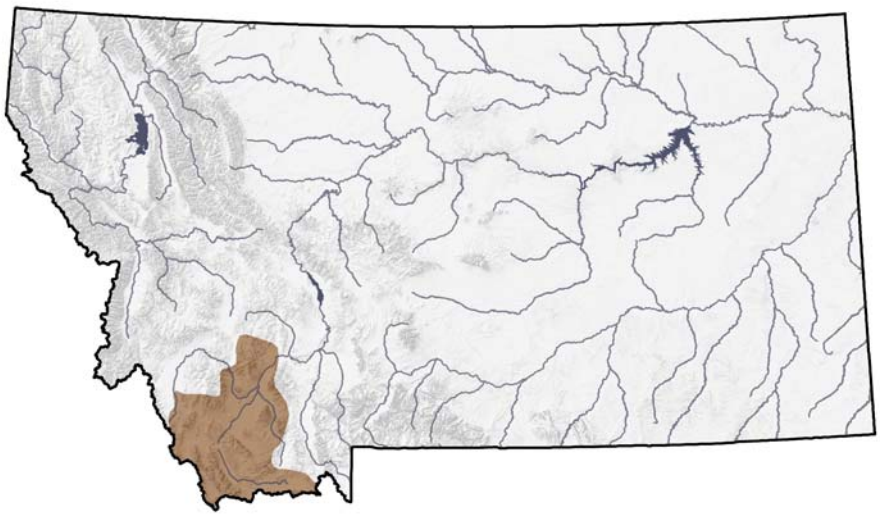

Figure 95. Distribution of the Great Basin Pocket Mouse

Range

The Great Basin pocket mouse is restricted in Montana to the extreme southwestern portion of the state, east of the Continental Divide. All records are from Beaverhead County except one from Jefferson County (Hoffmann et al. 1969; Foresman 2001a; Hendricks and Roedel 2002). Great Basin pocket mice are suspected to occur in Madison County. Individuals have been captured at elevations up to 6,660 feet (2,030 meters). The Great Basin pocket mouse is found throughout the Great Basin and adjacent regions of the West, from south-central British Columbia southward through eastern Washington and Oregon to southern California, Nevada, northern Arizona, western Utah, southern Idaho, southwestern Montana, and southwestern Wyoming (Verts and Kirkland 1988). It usually occurs below elevations of 8,200 feet (2,500 meters).

Habitat

Occupied habitats in Montana are arid and sometimes sparsely vegetated. They include grassland and shrubland with less than 40 percent cover; stabilized sandhills; and landscapes with sandy soils, more than 28 percent sagebrush cover, and 0.3 to 2 meters shrub height (Hoffmann et al. 1969; Frissell 1978; Hendricks and Roedel 2001, 2002; P. Hendricks, unpublished data).

Data from other portions of its range suggest a variety of western arid and semiarid habitats are occupied, including pine woodlands, juniper-sagebrush scablands, sandy short-grass steppes, and shrublands covered with sagebrush, bitterbrush, greasewood, and rabbitbrush; heavily forested habitats are avoided. Great Basin pocket mice are captured more often than expected (based on

availability) at sites with more than 40 percent ground cover. On plots where fire has killed the shrub cover, the species is one-third as abundant as on adjacent unburned plots. Great Basin pocket mice usually are found in habitats with light-textured, deep soils, and sometimes in shrublands among rocks. Presence is positively correlated with percent sand and negatively with percent clay. Adults sleep and rear young in underground burrows (Verts and Kirkland 1988; Verts and Carraway 1998).

Management

No special management activities are currently recognized in order to maintain viable populations of this species in Montana.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat loss, large-scale removal of sagebrush	Land management designed to maintain a mosaic of sagebrush cover, size, and age classes will benefit this species, especially if it promotes the growth of grasses and forbs within sagebrush stands
	Evaluate the quality and quantity of occupied and potentially suitable areas
Competition for grasses (livestock probably compete with pocket mice for grasses and reduce shrub and grass cover)	Rotation of livestock areas
Lack of biological information on Great Basin Pocket Mouse in Montana	Consider preparing a management plan for the Great Basin pocket mouse or include it into other comprehensive taxonomic plans

Management Plan

None

Citations

Foresman, K. R. 2001. The wild mammals of Montana. Special Publication No. 12. American Society of Mammologists.

Frissell, S. S. 1978. Nongame wildlife inventory. Prepared for U.S. Department of the Interior, Bureau of Land Management, Dillon Resource Area, Dillon, MT. 194 pp.

Hall, E. R. 1981. The Mammals of North America, Vols. I and II. John Wiley & Sons, New York, NY.

Hendricks, P., and M. Roedel. 2001. A faunal survey of the Centennial Valley sandhills, Beaverhead County, Montana. Report to the U.S. Bureau of Land Management and U.S. Fish and Wildlife Service. Montana Natural Heritage Program, Helena, MT.

Hendricks, P., and M. Roedel. 2002. Preble's Shrew and Great Basin Pocket Mouse from the Centennial Valley Sandhills of Montana. Northwestern Naturalist 83:31–34.

Hoffmann, R. S., P. L. Wright, and F. E. Newby. 1969. Distribution of some mammals in Montana. I. Mammals other than bats. Journal of Mammalogy 50(3):579–604.

NatureServe Explorer: An online encyclopedia of life. 2002. Version 1.6. Arlington, VA. http://www.natureserve.org/explorer.http://MNHP.nris.state.mt.us/animalguide (accessed: March 20, 2003).

Verts, B. J., and G. L. Kirkland, Jr. 1988. *Perognathus parvus*. American Society of Mammologists, Mammalian Species 318:1–8.

Verts, B. J., and L. N. Carraway. 1998. Land mammals of Oregon. University of California Press, Berkeley, CA. 668 pp.

Northern Bog Lemming (*Synaptomys borealis*)

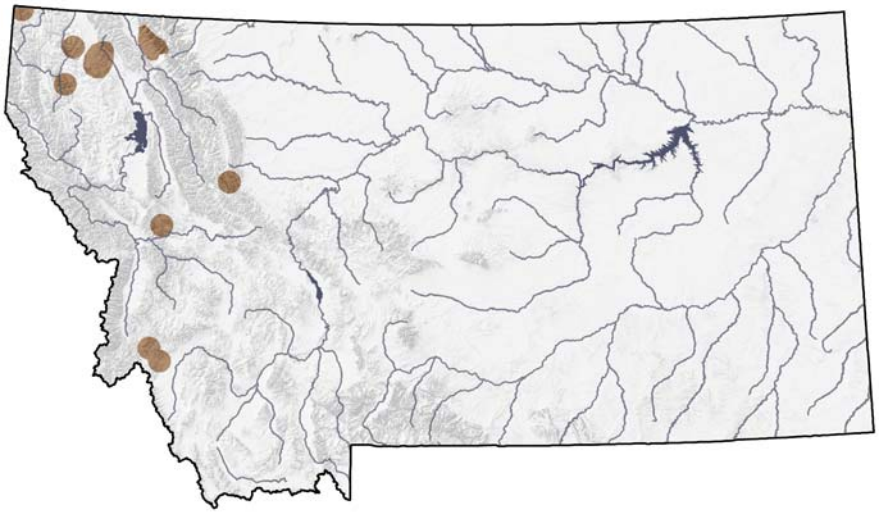

Figure 96. Distribution of the Northern Bog Lemming

Range

The northern bog lemming has a widespread distribution extending from Alaska east to Labrador and south to portions of the northern United States. In Montana the northern bog lemming is at the southern margin of its global distribution in the Rocky Mountains and has been documented at 18 isolated sites, found mainly on U.S. Forest Service–managed lands. Records are available for six counties (Beaverhead, Flathead, Lewis and Clark, Lincoln, Missoula, and Ravalli), with all but two sites (one in Beaverhead County, Lost Trail Pass, and one in Lewis and Clark County) occurring west of the Continental Divide (Reichel and Corn 1997; Foresman 2001a). Elevation of these sites ranges from 3,340 to 6,520 feet (1,018 to 1,987 meters), but a 2003 record from a new site in Ravalli County extends the upper elevation limit to 7,400 feet (2,256 meters) (B. Maxell, personal communication).

Habitat

Northern bog lemmings occupy a variety of habitats throughout their range, especially near the southern edge of their global distribution. Typically, these habitats have high moisture levels and include sphagnum bogs, wet meadows, moist mixed and coniferous forests, montane sedge meadows, krummholz spruce-fir forests with dense herbaceous and mossy understory, alpine tundra, mossy streamsides, and even sagebrush slopes in the case of *S. b. artemisiae* in British Columbia (Clough and Albright 1987; West 1999; Streubel 2000). Within these habitats, they occupy surface runways and burrow systems up to 12 inches deep and can be found in small colonies with population densities that may reach 36 individuals per acre. (Streubel 2000). They are active day and night

throughout the year, feeding on grasses and other herbaceous vegetation. Young are born in nests that may be underground or on the surface in concealing vegetation. Northern bog lemmings in Montana have been found in at least nine community types, including Engelmann spruce, subalpine fir, birch, willow, sedge (*Carex*), spike rush (*Eleocharis*), or combinations of the above, often occurring in wet meadows, fens, or boglike environments. Wright (1950) captured lemmings in a swampy area containing spruce trees, timothy, alder, and other moist-site plants (Wright 1950). The Upper Rattlesnake Creek specimen was captured in a wet-sedge/bluejoint meadow near subalpine fir (Adelman 1979). Areas with extensive moss mats, primarily sphagnum, are the most likely sites to find new populations (Wright 1950; Reichel and Beckstrom 1994; Reichel and Corn 1997; Pearson 1999; Foresman 2001a).

Management

No coordinated management activities have been developed or implemented for this species in Montana. Nevertheless, some populations on U.S. Forest Service lands are provided added protection through special management/conservation policy guidelines applied to peatlands, including the Research Natural Area (RNA) designation (Chadde et al. 1998). RNA designation typically prohibits manipulative management, such as timber harvest and livestock grazing. The Clean Water Act and state water quality standards protect water quality of these peatlands. Protection guidelines (Reichel and Corn 1997) should be applied to all sites where northern bog lemmings are known to occur, as well as potential peatland sites not yet surveyed for them.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Bogs/fens are threatened by range management practices, invasion of heavily grazed fens by exotic plants, and potential changes in the water regimes feeding the bogs/fens.	Minimize livestock grazing in drainages with unsurveyed moss mats
Timber harvest around bog/fen habitats as well as adjacent riparian areas used as dispersal corridors	Working with coordinating federal and state agencies, limit timber harvests within a buffer zone of 100 meters surrounding sphagnum or other fen moss mats or associated riparian areas that could provide corridors for dispersal to adjacent patches of suitable habitat

Poorly understood distribution of the species in Montana	Consider preparing a management plan for the northern bog lemming or include it into other comprehensive taxonomic plans
	Known sites should be monitored routinely to determine population persistence and trends
Human disturbances (timber harvesting and roads) are directly related to the decreased diversity of vascular plants, a common food source for northern bog lemmings in bogs/fens	Elimination of management activities that could destroy bogs (road-building, pothole blasting, trail construction, dam construction, alteration of surface and subsurface water flow, recreational vehicle use in fen habitats)

Management Plan

None

Citations

Adelman, E. B. 1979. A survey of the nongame mammals in the Upper Rattlesnake Creek drainage of western Montana. M.S. thesis, University of Montana, Missoula MT. 129 pp.

Chadde, S. W., J. S. Shelly, R. J. Bursik, R. K. Moseley, A. G. Evenden, M. Mantas, F. Rabe, and B. Heidel. 1998. Peatlands on national forests of the Northern Rockies.

Clough, G. C., and J. J. Albright. 1987. Occurrence of the northern bog lemming (*Synaptomys borealis*) in the northeastern United States. Canadian Field-Naturalist 101:611–613.

Foresman, K. R. 2001. The wild mammals of Montana. American Society of Mammalogists, Special Publication No. 12. 278 pp.

Groves, C. R. 1994. Effects of Timber Harvest on Small Mammals and Amphibians in Old-Growth Coniferous Forests on the Priest Lake Ranger District, Unpublished report to the Priest Lake Ranger District, Idaho Panhandle National Forest. The Nature Conservancy, Boulder, CO.

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Jones, W. M. 2003. Kootenai National Forest Peatlands: Description and Effect of Forest Management. Report to the Kootenai National Forest, Montana. Montana Natural Heritage Program, Helena, MT.

Pearson, Dean E. 1999. Small mammals of the Bitterroot National Forest: a literature review and annotated bibliography. General Technical Report RRS-GTR-25. Ogden, UT: U.S.D.A. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 63 pp.

Reichel, J. D., and J. G. Corn. 1997. Northern bog lemmings: survey, population parameters, and population analysis. Unpublished report to the Kootenai National Forest. Montana Natural Heritage Program, Helena, MT. 27 pp.

Reichel, J. D., and S. G. Beckstrom. 1994. Northern bog lemming survey: 1993. Unpublished report. Montana Natural Heritage Program. Helena, MT. 87 pp.

West, S. D. 1999. Northern bog lemming (*Synaptomys borealis*). Pp. 655–656 in the Smithsonian book of North American mammals, D. E. Wilson and S. Ruff, eds. Smithsonian Institution Press, Washington, DC.

Wright, P. L. 1950. *Synaptomys borealis* from Glacier National Park, Montana. Journal of Mammalogy 31(4):460.

Meadow Jumping Mouse (*Zapus hudsonius*)

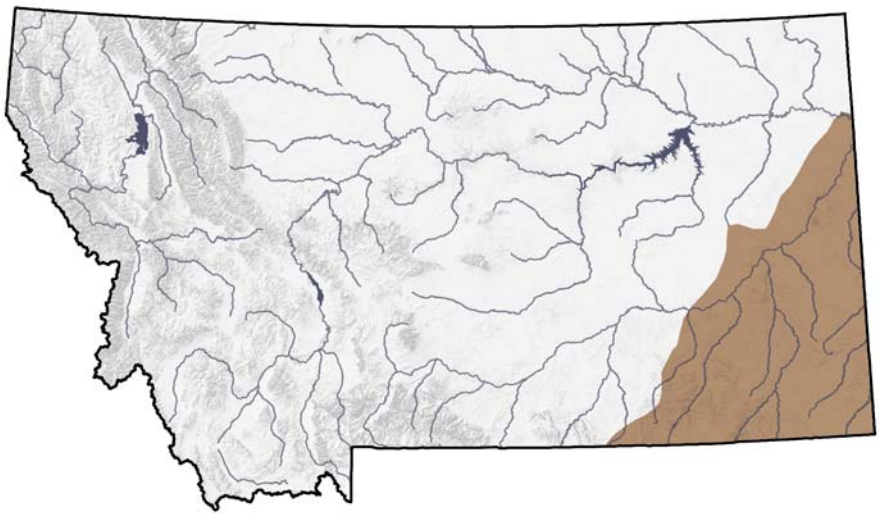

Figure 97. Distribution of the Meadow Jumping Mouse

Range

Montana is on the western edge of the species' global distribution in the northern Great Plains. The meadow jumping mouse has been documented in six eastern and southeastern counties (Bighorn, Carter, Dawson, Powder River, Richland, and Wibaux), at elevations up to 4,200 feet (1,272 meters) (Foresman 2001a; Montana Natural Heritage Program database).

Habitat

In Montana, meadow jumping mice have been found in dense, tall, and lush grasses and forbs in marshy areas (sometimes with standing water), riparian areas, woody draws, and grassy upland slopes, sometimes within or near forested sites of ponderosa pine (Lampe et al. 1974; Matthews 1980; Matthews and Swenson 1982).

The meadow jumping mouse is generally described as a species that occupies moist lowland habitats rather than drier uplands, preferring relatively dense vegetation in open grassy and brushy areas of marshes, meadows, swamps, and open conifer forests and often favoring sites bordered by small streams. On the northern Great Plains this usually results in its restriction primarily to riparian habitats. When inactive, meadow jumping mice occupy underground burrows, usually in banks or hills (in winter) or under logs or grass clumps. Young are born in an underground nest or under other cover (Krutzsch 1954; Whitaker 1972; Jones et al. 1983).

Management

No special management activities have been developed or implemented for this species in Montana. Refer to the following articles for more information on the management of the meadow jumping mouse: Lampe et al. 1974; Matthews 1980; Matthews and Swenson 1982.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Destruction of natural springs/seeps by and for livestock, and wetland conversion	Increased management and protection of all springs and seeps within the potential range
Lack of knowledge regarding immediate and long-term impacts of grazing	Prepare a conservation plan addressing species-specific concerns and actions or those pertaining to a suite of species with similar habitat use and needs
Lack of data on species status, distribution, habitat use, and abundance in Montana	Standardized surveys in eastern and southeastern Montana to obtain estimates of population status, distribution, and habitat use, and to monitor known populations

Management Plan

None

Citations

Foresman, K. R. 2001. The wild mammals of Montana. American Society of Mammalogists, Special Publication No. 12. 278 pp.

Jones, J. K., Jr., D. M. Armstrong, R. S. Hoffmann, and C Jones. 1983. Mammals of the northern Great Plains. University of Nebraska Press, Lincoln, NE. 379 pp.

Krutzsch, P. H. 1954. North American jumping mice (genus *Zapus*). University of Kansas Publications, Museum of Natural History 7:349–472.

Lampe, R. P., J. K. Jones Jr., R. S. Hoffman, and E. C. Birney. 1974. The mammals of Carter County, southeastern Montana. Occasional Paper. Museum of Natural History, University of Kansas 25:1–39.

Matthews, W. L., and J. E. Swenson. 1982. The mammals of east-central Montana. Proceedings of the Montana Academy of Sciences 39:1–13.

Matthews, W. L. 1980. The meadow jumping mouse in southeastern Montana. The Prairie Naturalist 12(2):63–64.

Whitaker, J. O., Jr. 1972. *Zapus hudsonius*. American Society of Mammalogists, Mammalian Species No. 11. 7 pp.

Gray Wolf (*Canis lupus*)

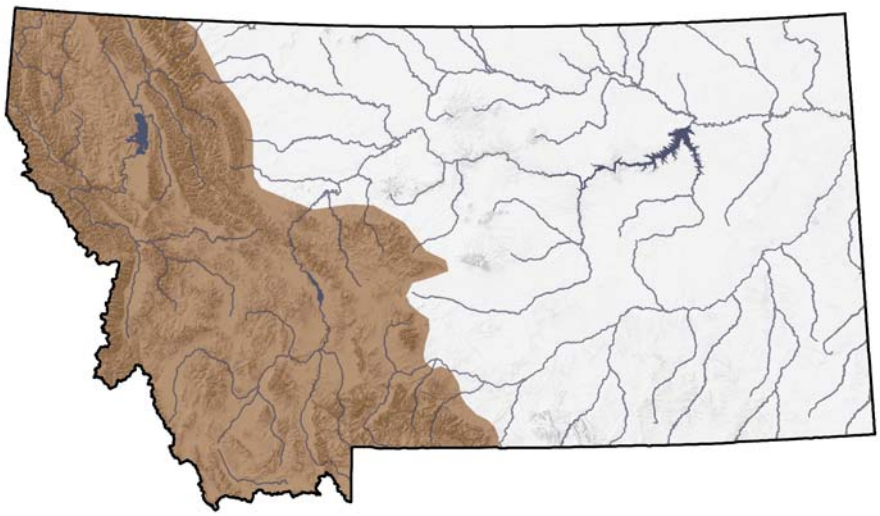

Figure 98. Distribution of the Gray Wolf

Range

There are three federally designated wolf recovery areas in the Northern Rockies. Montana contains portions of all three. Natural dispersers decolonized northwest Montana beginning in the late 1970s. In 1995 and 1996 wolves were reintroduced in both central Idaho and Yellowstone National Park. As those reintroduced populations grew, the wolves dispersed, and the three distinct recovery areas now function increasingly as one large meta-population. The distribution of wolves in Montana has expanded accordingly, but is still primarily in western Montana. Wolves are capable of dispersing long distances and could plausibly attempt to colonize eastern Montana. Individual wolves have been documented in eastern Montana, but no packs have been confirmed.

Habitat

The gray wolf exhibits no particular habitat preference. Wolves establishing new packs in Montana have demonstrated greater tolerance of human presence and disturbance than previously thought characteristic of this species (Thiel 1985; Mech et al. 1988; Mech 1989). They have established territories where prey is more abundant at lower elevations than expected, especially in winter (Montana Fish, Wildlife & Parks 2003).

Management

Although wolves dispersing from Canada were occasionally observed, gray wolves were essentially extirpated from Montana and the rest of the western United States in the early 1900s primarily due to conflicts with people. Wolves

started recolonizing the area around Glacier National Park in 1979, and the first den documented in Montana in more than 50 years was found in Glacier National Park in 1986. Wolves have since colonized much of northwestern Montana as a result of dispersal from Canada and Glacier National Park. In 1995 and 1996 wolves were reintroduced into Yellowstone National Park and central Idaho. Wolves resulting from these reintroductions have since expanded into areas in Montana near these reintroduction sites and continue to expand in numbers and distribution in Montana.

Gray wolves in Montana are classified under the Endangered Species Act as "endangered" in the northwest Montana federal recovery area and as "experimental non-essential" across southern Montana in the federal central Idaho and Greater Yellowstone recovery areas. Gray wolves reached biological recovery goals for the northern Rocky Mountains at the end of 2001. However, the process of delisting the species is currently on hold due to the lack of approved management plans from all three states (Montana, Idaho, and Wyoming). Early in 2004 the U.S. Fish and Wildlife Service approved the Montana Gray Wolf Conservation and Management Plan (Montana Fish, Wildlife & Parks 2003). Since then, Montana Fish, Wildlife & Parks (FWP) has been expanding its role, and the agency is now implementing the state's wolf conservation and management plan. FWP assumed that management responsibility through a cooperative agreement between the two agencies. The agreement transferred legal authority to FWP to begin implementing as much of the state plan as allowed under federal regulations, even though wolves currently remain listed.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Variable public tolerance in Montana	Public outreach to increase awareness of wolf biology, conservation, and management
	Technical assistance to private landowners to decrease potential for negative livestock-wolf interactions
Human-caused mortality (illegal shooting, conflicts with livestock, misidentification, vehicle or train strikes)	Adaptive management that is dynamic with the status of wolf populations and distribution
	Monitoring to document maintenance of a recovered population via different protocols
Disease	Monitor populations through blood sampling to identify the extent of the problem

Management Plan

Montana Fish, Wildlife & Parks. 2003. Montana Gray Wolf Conservation and Management Plan.

Northern Rocky Mountain Wolf Recovery Team. 1980. Northern Rocky Mountain wolf recovery plan interagency report. 67 pp.

U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain wolf recovery plan. U.S. Fish and Wildlife Service, Denver CO. 119 pp.

U.S. Fish and Wildlife Service. 1970. A summary of the northern Rocky Mountain wolf recovery plan.

Citations

Mech, L. D. 1989. Wolf population survival in an area of high road density. American Midland Naturalist 121:387–389.

Mech, L. D., et al. 1988. Wolf distribution and road density in Minnesota. Wildlife Society Bulletin 16:85–87.

Thiel, R. P. 1985. Relationship between road densities and wolf habitat suitability in Wisconsin. American Midland Naturalist 113:404–407.

Grizzly Bear (*Ursus arctos horribilis*)

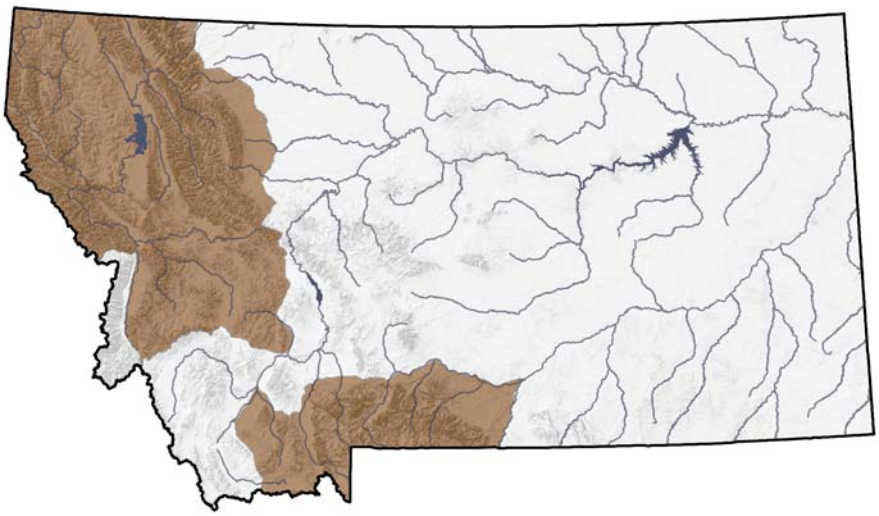

Figure 99. Distribution of the Grizzly Bear

Range

In Montana, grizzlies occur in northwest Montana, extending through Glacier National Park, into the Bob Marshall Wilderness area, and to the Blackfoot River. Grizzlies are also found coming down east off the Rocky Mountain Front. Individuals may also be found in the Helena, Bitterroot, and Lolo national forests. In addition, grizzlies are found in Yellowstone National Park, and individuals are moving into the Absaroka-Beartooth Wilderness and the Gallatin and Beaverhead/Deerlodge national forests.

Habitat

In Montana, grizzlies primarily use meadows, seeps, riparian zones, mixed shrub fields, closed timber, open timber, side-hill parks, snow chutes, and alpine slabrock habitats. Habitat use is highly variable between areas, seasons, local populations, and individuals (Servheen 1983; Craighead et al. 1982; Aune et al. 1984). Historically, the grizzly also was present on the plains occurring throughout most of eastern Montana.

Management

Current grizzly bear management throughout its range in Montana is dictated by its threatened listing under the Endangered Species Act (ESA). Under the ESA, no federal actions can cause further endangerment of grizzly bears. Federal land management agencies such as the U.S. Forest Service and the Bureau of Land Management must conduct management actions on their lands so that grizzly bears are not jeopardized. Interagency grizzly bear management guidelines have

been developed for these managed lands. In addition, the state of Montana has the Grizzly Bear Policy (MCA 12.9.103), which outlines policy guidelines for Montana Fish, Wildlife & Parks to promote the conservation of grizzly bears in Montana. Other regionally specific management plans include the Grizzly Bear Management Plan for Southwestern Montana 2002–2012 (Montana Fish, Wildlife & Parks 2002) and various tribal, national forest, and national park plans and policies. Most of these management plans are centered on three major themes: (1) Management of habitat to ensure grizzly bears have large expanses of suitable interconnected lands in which to exist, (2) Management of grizzly/human interactions, which most often result in death for the bears (and sometimes humans) involved (this is a particularly important concern for female bears because their removal may have significant impacts on the demography of isolated populations), and (3) Research to determine the population size and trends to ensure that grizzly bear populations are not being jeopardized. Please consult any of the management plans listed above for grizzly bear management specifics.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Human-bear and bear-livestock interactions	Proactive management including public outreach, utilizing Montana citizens
	Reduce human-caused mortality, including vehicles and trains
	Continued interagency management efforts
Habitat loss, degradation, and fragmentation	Protection of critical habitats through easements and other methods
Genetic fragmentation among Montana populations	Ongoing research projects, including genetic analysis projects

Management Plans

Dood, A. R., R. D. Brannon, R. D. Mace. 1986. Final Programmatic Environmental Impact Statement: The Grizzly Bear in Northwestern Montana. Montana Department of Fish, Wildlife & Parks.

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Servheen, C. 1993. Grizzly bear recovery plan. Unpublished report to the U.S. Fish and Wildlife Service. University of Montana, Missoula, MT. 181 pp.

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U.S. Fish and Wildlife Service. 1982. Grizzly bear recovery plan. Unpublished report prepared in cooperation with recovery team leader Don L. Brown of the Montana Department of Fish, Wildlife & Parks. 195 pp.

Citations

Aune, K., T. Stivers, and M. Madel. 1984. Rocky Mountain Front grizzly bear monitoring and investigation. Montana Department of Fish, Wildlife & Parks, Helena, MT. 239 pp.

Craighead, J. J., J. Sumner, and G. Scaggs. 1982. A definitive system for analysis of grizzly bear habitat and other wilderness resources. Wildlife-Wildlands Institute Monograph 1. University of Montana, Missoula, MT. 279 pp.

Servheen, C. 1983. Grizzly bear food habits, movements and habitat selection in the Mission Mountains, Montana. Journal of Wildlife Management 47:1026–1035.

Black-footed Ferret (*Mustela nigripes*)

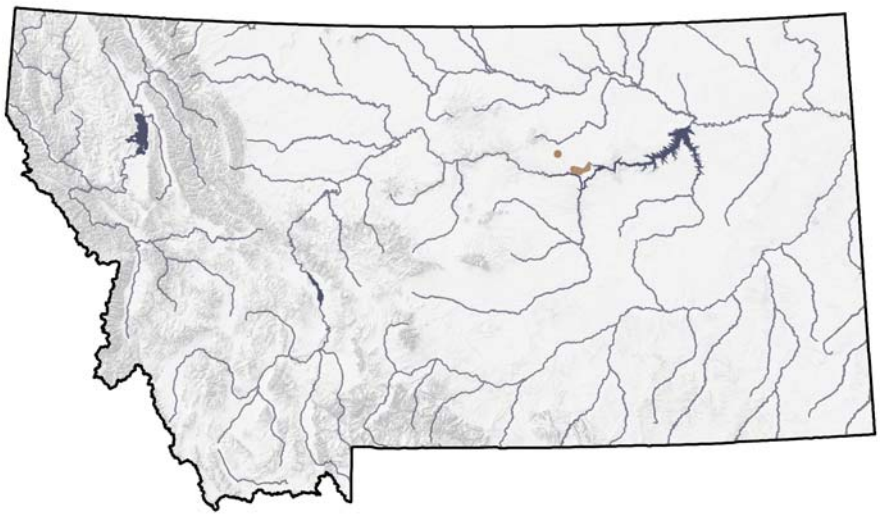

Figure 100. Distribution of the Black-footed Ferret

Range

Only reintroduced populations of the black-footed ferret in southern Phillips County are currently present. Historically, ferrets ranged throughout much of central and eastern Montana.

Habitat

Black-footed ferrets are intimately tied to prairie dogs (*Cynomys* spp.) throughout their range and have only been found in association with prairie dogs. They are therefore limited to the same open habitat used by prairie dogs: grasslands, steppe, and shrub-steppe. Black-footed ferrets do not dig their own burrows and rely on abandoned prairie dog burrows for shelter. Only large complexes (several thousand acres of closely spaced colonies) can support and sustain a breeding population of black-footed ferrets. It has been estimated that about 40 to 60 hectares of prairie dog colony is needed to support one ferret, and females with litters have never been found on colonies smaller than 49 hectares (Miller et al. 1996). Ferrets scent-mark to maintain spatial separation (Richardson 1986).

Management

Black-footed ferrets have been extirpated from most of their former large range largely as a result of loss of habitat due to prairie dog control programs. Canine distemper, in conjunction with captures for captive breeding, resulted in extirpation of the last known wild population near Meeteetse, Wyoming, by early 1987. See Miller et al. (1996) for more information on the discovery of the Meeteetse ferrets and subsequent distemper-caused decline and captive

breeding decisions that occurred in 1985. All known populations are a result of the reintroduction of captive-bred ferrets from animals taken into captivity from this population. Reintroductions have occurred annually in Montana on federal and/or tribal land since 1994 with varying success. It is unknown why reintroductions in Montana have not established a self-sustaining population. Predation by coyotes and badgers and long-distance dispersal may be the primary problems with the reintroduction efforts. Disease, such as sylvatic plague, has also apparently resulted in deaths for released animals. Some wild reproduction has occurred, but no self-sustaining populations have been established yet.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Reduction of habitat	Research to validate critical habitat needs of black-footed ferrets
	Support strategic conservation easements by conservation organizations and public agencies to enhance critical habitat
	Work to develop information campaign to inform land owners and public concerning the need to maintain healthy critical habitats for black-footed ferret
Lack of prey base due to declining prairie dog colonies	Work through cooperative agreements to manage for healthy populations of prairie dogs
Disease, such as canine distemper	Continue monitoring diseases that impacts health of populations
Failure of reintroduction efforts	Continue supporting future reintroduction efforts that include the adaptive management paradigm

Management Plans

Anderson, M. E. et al. 1978. Black-footed ferret recovery plan. U.S. Fish and Wildlife Service Black-footed Ferret Recovery Team. 150 pp.

Bureau of Land Management (BLM). 1979. Habitat management plan prairie dog ecotypes. USDI, BLM, Montana State Office. Wildlife Habitat Area MT-02-06-07-S1. 61 pp.

Christopherson, D., R. Stoneberg, R. Matchett, D. Biggins, J. Grensten, A. Dood, B. Haglan. 1994. Black-footed ferret reintroduction in Montana: project description and 1994 protocol. 31 pp + appendix.

Montana Fish, Wildlife & Parks. 1992. North-central Montana black-footed ferret reintroduction and management plan. Prepared by North Central Montana Working Group. 59 pp.

U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants: establishment of a nonessential experimental population of black-footed ferrets in north-central Montana; final rule. Federal Register 59:42696-42715.

U.S. Fish and Wildlife Service (USFWS). 1988. Black-footed ferret recovery plan. Denver, CO. 154 pp.

Citations

Miller, B., R. P. Reading, and S. Forrest. 1996. Prairie Night. Smithsonian Institute Press. Washington DC. 320 pp.

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Canada Lynx (*Felis lynx*)

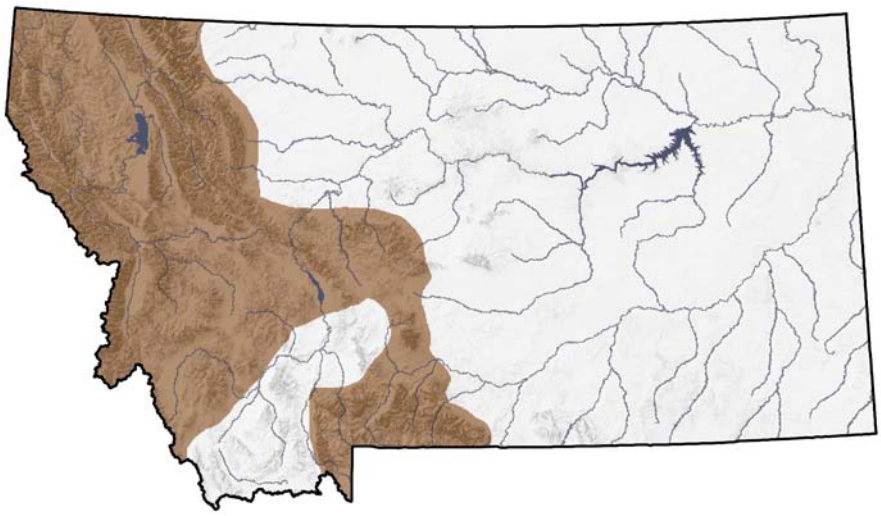

Figure 101. Distribution of the Canada Lynx

Range

Canada lynx are limited to western mountains of Montana; however, dispersers have been occasionally documented in eastern Montana.

Habitat

Canada lynx west of the Continental Divide generally occur in subalpine forests at elevations between 1,220 and 2,150 meters, in stands composed of pure lodgepole pine but also mixed stands of subalpine fir, lodgepole pine, Douglas-fir, grand fir, western larch, and hardwoods (J. Squires, personal communication 1999, in Ruediger et al. 2000). In extreme northwestern Montana, primary vegetation may include cedar-hemlock habitat types (Ruediger et al. 2000). East of the Continental Divide, the subalpine forests inhabited by lynx occur at higher elevations (1,650 to 2,400 meters) and are composed mostly of subalpine fir. Secondary habitat is intermixed Engelmann spruce and Douglas-fir habitat types where lodgepole pine is a major seral species (Ruediger et al. 2000). Throughout their range, shrub-steppe habitats may provide important linkage habitat between the primary habitat types described above (Reudiger et al. 2000). Typical snow conditions are important factors for the species, with lynx occurring primarily in habitats that also receive relatively uniform and moderately deep snowfall amounts (total annual snowfall of 100 to 127 centimeters) (Kelsall et al. 1977). Within these habitat types, disturbances that create early successional stages, such as fire, insect infestations, and timber harvest, provide foraging habitat for lynx by creating forage and cover for snowshoe hares, although older forests also provide habitats for snowshoe hares and lynx for longer periods of time than disturbance-created habitats (Ruediger et al. 2000).

Canada lynx avoid large openings but often hunt along edges in areas of dense cover (Ruediger et al. 2000). When inactive or birthing, they occupy dens typically in hollow trees, under stumps, or in thick brush. Den sites tend to be in mature or old-growth stands with a high density of logs (Koehler 1990; Koehler and Brittell 1990). These habitats must be near or adjacent to foraging habitat because the hunting range of the female is reduced during this time (Ruediger et al. 2000).

In the South Fork Flathead River, Canada lynx were mostly located in fire-created, densely stocked young stands of lodgepole pine where snowshoe hares were most abundant. No locations in open or semi-open areas were observed (Koehler at al. 1979). In the Garnet Range, most were found in subalpine fir forest (Smith 1984). Denning sites are found in mature and old-growth lodgepole pine, spruce, and subalpine fir forests with a high density of logs (Koehler 1990, Koehler and Brittell 1990). Denning stands need not be large (1 to 3 hectares), but several stands should be interconnected (Koehler and Brittell 1990). Lynx require cover for stalking and security, and usually do not cross openings wider than 100 meters (Koehler and Brittell 1990).

Management

Canada lynx are classified as a furbearer in Montana, but the trapping season is currently closed in the state. Any lynx accidentally trapped must be released uninjured and reported to designated Montana Fish, Wildlife & Parks (FWP) employees in the trapping district within five days. Any lynx trapped that cannot be released unharmed must be reported to FWP for assistance to determine disposition and/or collection of the animal. The Canada Lynx was listed as a threatened species under the Endangered Species Act in the contiguous United States in 2000 because of the inadequacy of guidance for conservation of lynx in the National Forest Land and Resource Management Plans and Bureau of Land Management Land Use Plans (Reudiger et al. 2000). Subsequently, the Canada Lynx Conservation Assessment and Strategy (Reudiger et al. 2000) was produced to provide guidance for conservation measures on federally managed lands to ensure that lynx populations were not jeopardized by management of critical habitat. Please consult the plan for details of this strategy.

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Habitat, specifically conifer loss and destruction	Adequate management strategies between agencies to protect dense tree stands
	Maintain natural mosaic of forest by allowing low- to medium-level fires

Fragmented landscapes suppress principle prey (snowshoe hare) populations	Continue research on prey base (snowshoe hare and red squirrel)
Road construction decreases connectivity and movement and increases potential for human disturbance	Conserve contiguous tracks of habitat by working with state and federal agencies to manage for road construction and development
Grazing increases competition for forage resources with Canada lynx prey	Manage forests for sustainable livestock grazing

Management Plan

Ruediger, Bill, and 14 others on Lynx Biology Team. 2000. Canada Lynx Conservation Assessment and Strategy. 120 pp.

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American Bison (*Bos bison*)

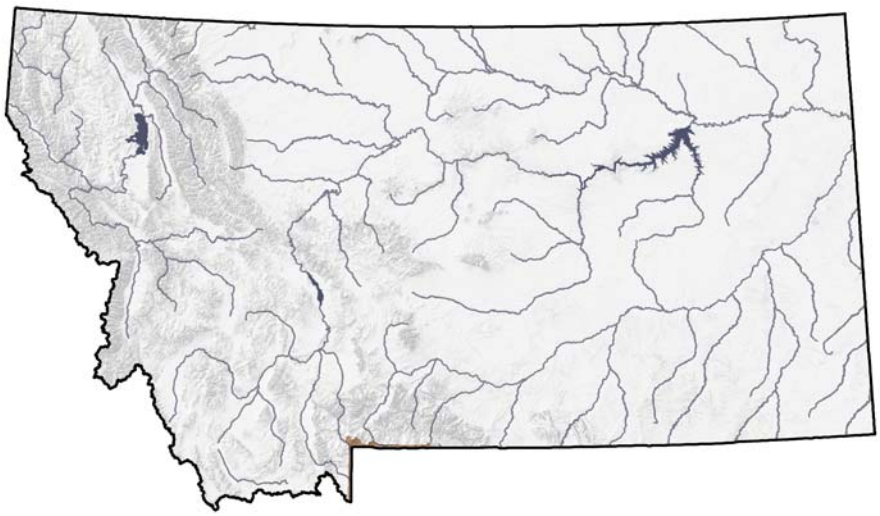

Figure 102. Distribution of the American Bison

Range

Free-ranging American bison in Montana are located only in areas surrounding Yellowstone National Park. Another semi-wild population occurs at the National Bison Range in northwestern Montana. American bison are also located on private ranches throughout Montana. The animals in Yellowstone National Park are partially descended from animals originally found in the park. Intervention has led to a genetically diverse population with genetics derived from bison imported in the early 1900s mixed with remnant native bison following the great reduction in the 1800s. Other bison descended from five founder herds captured in various portions of the bison's former range, including Canada. Some were caught along the Milk River in Montana (Pattie and Hoffman 1992). American bison were formerly widespread in North America from Alaska and western Canada across the United States into northern Mexico.

Some American bison migrate out of Yellowstone National Park during the winter; these movements are more frequent and involve greater numbers of animals during years of heavy snow when populations are high (generally more than 3,000 individuals) (National Academy of Sciences 1998). Recently (1985–1986), bison harvest has resumed in response to Montana movements out of Yellowstone National Park. American bison at the National Bison Range are confined to the range and no migration is possible. This species previously made mass migrations across the prairie in spring and fall, with mountain populations moving to lower elevations in valleys.

Taxonomists recognize two subspecies of bison—the plains and the woodland bison—which have distinct differences in habitat preference and historical range.

Habitat

Because of restrictions, currently occupied habitat does not reflect the full natural range for American bison. Throughout their range, American bison inhabit woodlands and open plains and grasslands. Woodlands and openings in boreal forests, meadows, and river valleys are used in the northern parts of their range. Like other large grazers, they are attracted to burn areas the next growing season (Shaw and Carter 1990). During the growing season at the Konza Prairie in northeastern Kansas, they preferred areas that had been burned in spring. Summer grazing was concentrated in a large watershed area (79 to 119 hectares) dominated by warm-season, perennial C4 grasses. In fall and winter they grazed both burned and unburned watersheds more uniformly, but grazed most intensively in areas with large stands of cool-season, C3 grasses (Vinton et al. 1993).

Management

Management of free-ranging American bison in Montana has been controversial. The presence of brucellosis in these animals and their migration out of Yellowstone National Park into adjacent public and private lands has led to conflicts between private landowners, citizens, public administrative agencies, and public land management agencies. Free-ranging herds in Montana are currently managed under the Interagency Bison Management Plan. The current distribution of Yellowstone National Park bison and the management potential of this herd is limited to several very small areas outside of Yellowstone National Park where they can be tolerated and will not pose a disease risk to cattle grazing on surrounding habitats. It is unlikely that the distribution of bison in the Greater Yellowstone area will dramatically change until brucellosis is eliminated from the herd. Efforts are currently being explored to isolate a brucellosis-free population with acceptable genetics in order to establish free-ranging herds outside Yellowstone National Park. Establishing this type of herd would require extensive cooperation from various federal and state agencies and private partners. If successful, these herds could serve to help restore the ecology of many community types in greatest need of conservation, such as grassland complexes, mixed shrub/grass associations, woody draws, and mixed broadleaf forests. Along with the restoration of these community types, many associated species in greatest need of conservation could benefit (e.g., prairie dogs, blackfooted ferrets, and swift foxes).

Conservation Concerns & Strategies

Conservation Concerns	Conservation Strategies
Disease (brucellosis)	Brucellosis control
Control issues for bison moving in and out of Yellowstone National Park	Continue development of working relationships with landowners

The American bison is ecologically extinct outside Yellowstone National Park and has a very reduced range of free-roaming herds	Establish free-ranging, disease-free American bison populations in suitable grassland habitats outside Yellowstone National Park where they can function ecologically and operate as keystone species to restore grassland systems
Bison genome has been eroded by unnatural management practices and introgression with domestic cattle genes	Preserve wild bison genome through herd expansion and restoration projects in North America
Exclusion of American bison from management plans as part of the natural mammalian fauna in Montana eligible for regulated harvest	Create populations of wild bison that can be harvested and provide economic and social benefits to Montana

Management Plan

Montana Department of Livestock and Montana Fish, Wildlife & Parks. 1996. Interim bison management plan. 70 pp.

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